

MODELLING AFRICAN ECONOMIES: CONTEXT AND CHALLENGES

BY

MOSES O. ODUW



African Institute for Applied Economics

OUTLINE OF **PRESENTATION**

General overview and outlook of economies of Africa

State of African models- the journey so far

Challenges of modelling African economy

Rising to the challenges –the uncovered grounds

Conclusion

GENERAL OVERVIEW OF ECONOMIES OF AFRICA

- **AFRICA IS THE SECOND LARGEST CONTINENT WITH A POPULATION FAIRLY OVER 1 BILLION**
- **VERY RICH IN NATURAL RESOURCES**
 - It accounts for 90 per cent of the world's cobalt and platinum, 50 per cent of its gold, 98 per cent of its chromium, 70 per cent of its tantalite, 64 per cent of its manganese, and one-third of its uranium.
 - The bumpy economy is occasionally faced with constant external shocks, resulting from its heavily reliance on agriculture, which accounts for two-thirds of the labour force, 35 per cent of GNP and 40 per cent of foreign exchange earnings.
 - Available statistics from the World Bank (WB) shows that the continent has well over 63.0 per cent rural population, agricultural land area covering over 45.0 per cent
- **SHOCKINGLY, IT IS THE WORLD'S POOREST REGION WITH A MULTI-FACETED CRISIS ECONOMICALLY, SOCIALLY AND POLITICALLY.**

GENERAL OVERVIEW OF ECONOMIES OF AFRICA

- currently, it controls only about 2.30 per cent of the world economy, fairly higher than Oceania that accounts for about 1.60 percent
- while Americas, Europe and Asia accounts for 35.60 per cent, 35.20 per cent and 25.40 per cent respectively
- 80.5% of the Sub-Saharan Africa population was living on less than \$2.50 (PPP) a day in 2005
- most countries in Africa are typical example of GPP
- continually engulfed in ethnicity crisis and political instability; humanitarian crisis in the Darfur region of Sudan and Somalia strife in Zimbabwe, conflict in Côte d'Ivoire, Tunisia, Egypt, and Libya.
- These crises further pushed African countries into arms struggle, poverty, and sorry humanitarian crises

OUTLOOK OF ECONOMIES OF AFRICA

■ **OPPORTUNITIES AND PROSPECTS FOR AFRICA –LIGHT IN THE TUNNEL?**

- Individually, Africa fit into the crises imaged painted, but as a block Africa seems to have made some reasonable progress in the last decades
- real GDP rose by 4.9 percent a year from 2000 through 2008.
- Inflation was as low as average of 7.9 per cent, though Zimbabwe and Angola maintained average of 20 per cent
- despite the global meltdown the continent posted average of 5 per cent growth rate
- Politically people are reclaiming their political sovereignty as in the case of Tunisia, Egypt, and ongoing Libya
- Political “godfatherism” is crumbling to a halt as power of incumbency is at the mercy of power owners – electorate. The cases of Ghana and Nigeria are living testimonies
- Consumer confidence is looking up as misery index is gradually declining
- South Africa has broken and extended the BRIC wall of emerging economies to BRICS

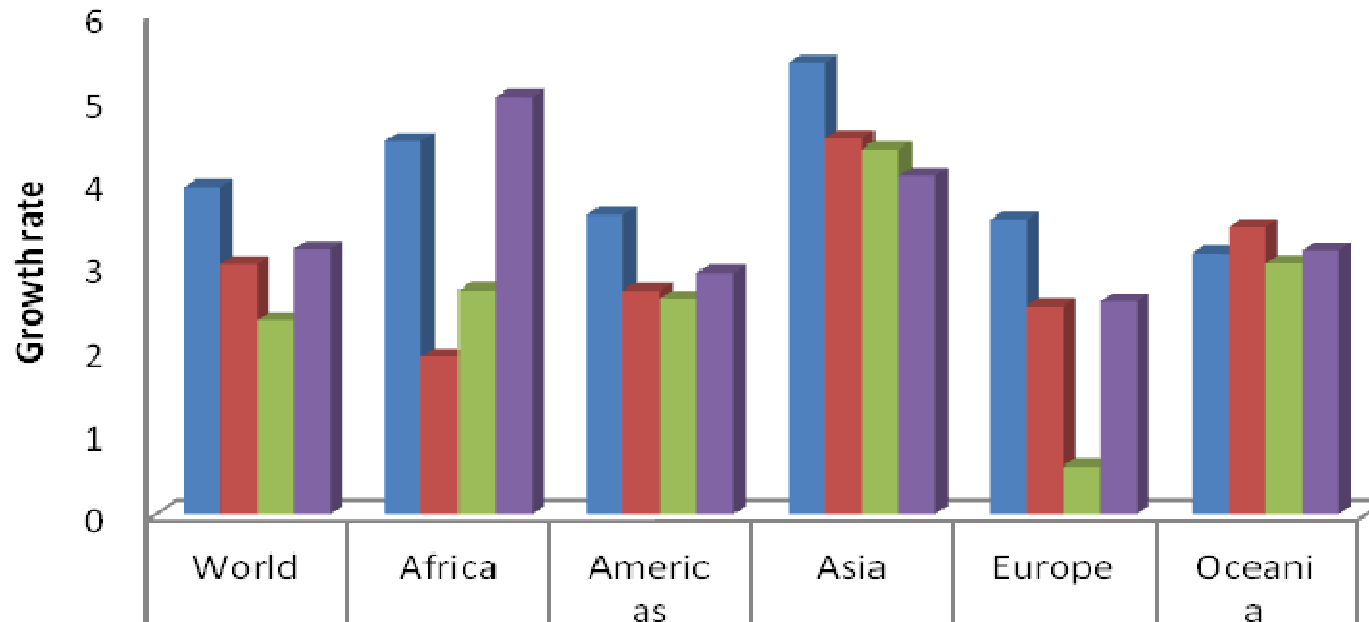
OUTLOOK OF ECONOMIES OF AFRICA

■ **AFRICA'S SUCCESS STORY – SUSTAINABLE?**

- African countries continue to depend on single products, with shrinking manufacturing sector..
- Africa's growth of the past decade has not been accompanied by diversification from traditional exports or the expansion of other sectors, such as manufacturing and value-added services
- many countries, ranging from Nigeria and South Africa to Lesotho and Zambia, have experienced additional stresses on their manufacturing sectors as Asian exports have overshadowed domestically made goods, and as the region's exports continue to be constrained by receding demand

OUTLOOK OF ECONOMIES OF AFRICA

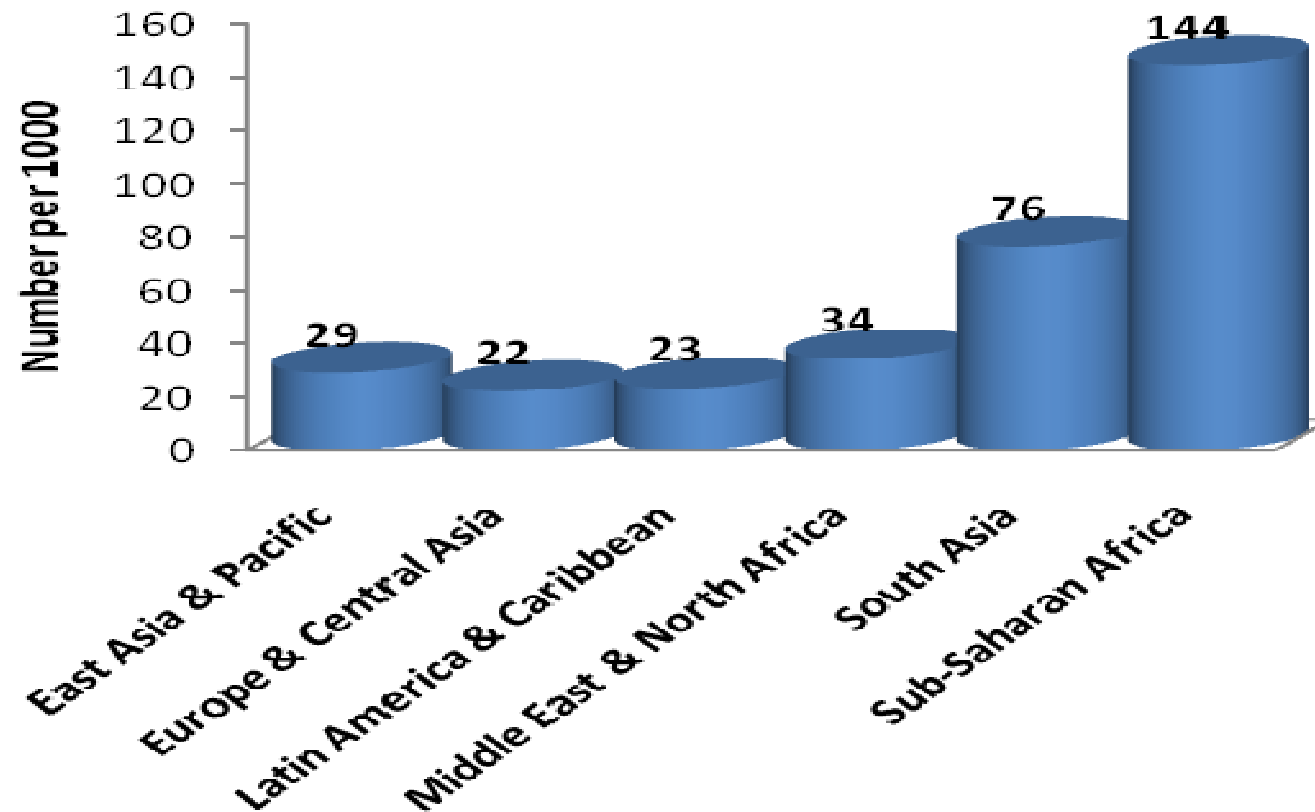
World average growth rate (1971-2008)



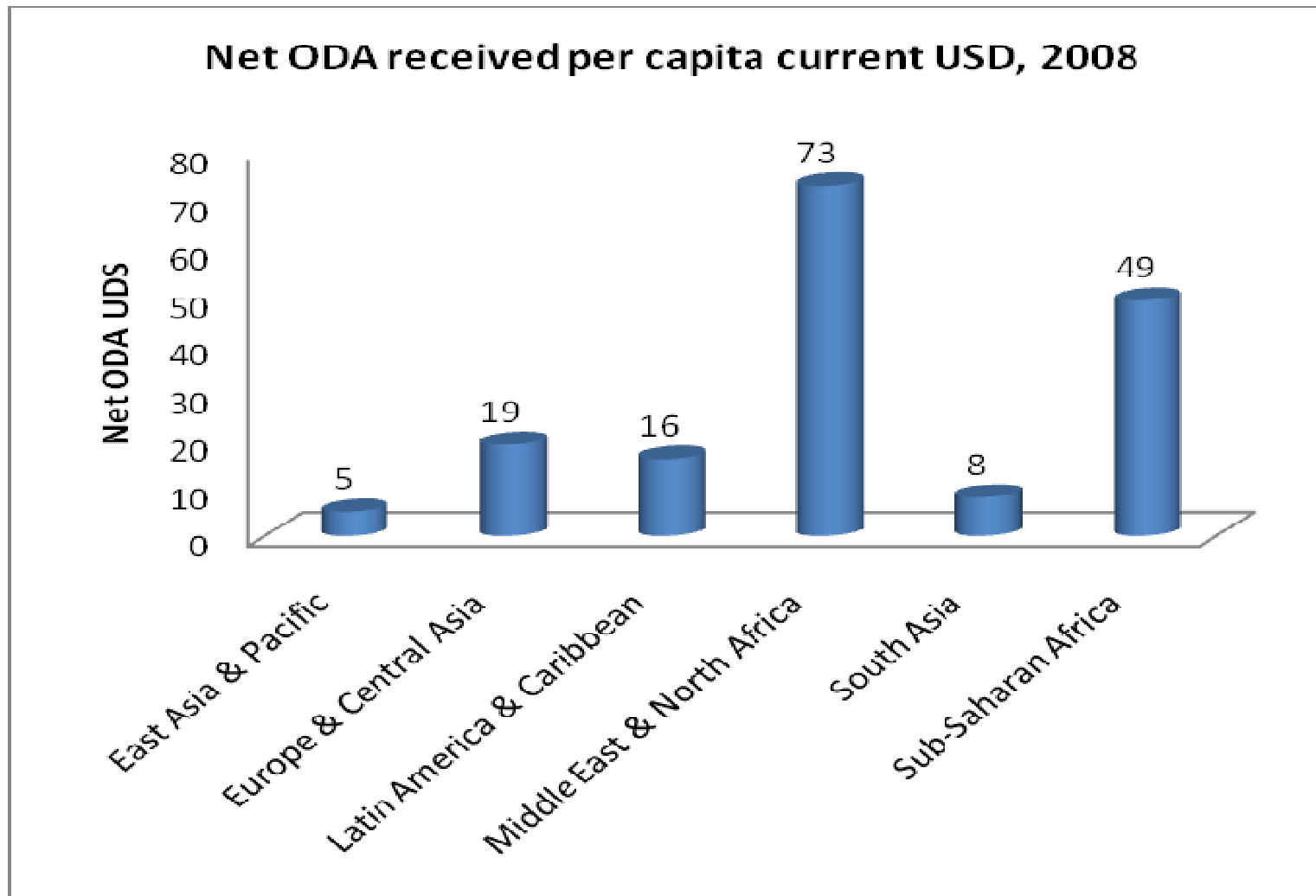
	World	Africa	Americas	Asia	Europe	Oceania
■ 1971-1979	3.93	4.48	3.60	5.42	3.54	3.13
■ 1980-1988	3.00	1.89	2.69	4.51	2.50	3.45
■ 1989-1997	2.32	2.69	2.59	4.38	0.58	3.01
■ 1998-2008	3.18	5.01	2.90	4.06	2.55	3.16

OUTLOOK OF ECONOMIES OF AFRICA

Global under five mortality rate per 1000 births, 2008



OUTLOOK OF ECONOMIES OF AFRICA



STATE OF AFRICAN MODELS

■ THE JOURNEY SO FAR

- the use of macroeconometric models (MEMs) for policy analysis and forecasting has a tumultuous history since WW II, yet there is no consensus on the appropriate analytical framework for the study or developing African macroeconomic model issues.
- different writers Haque, Lahiri, & Montiel, (1990), Soludo, (2002), and Ankolgo, (2005) generously captured the state of African models as:
 - having individual models suitable for different tasks, proliferated with different, and often conflicting, assumptions about a wide range of crucial aspects of these economies;
 - that macro-modeling in Africa skewed towards academic and research papers with PhD desertion constituting about 80%, and
 - African models are in the minds of people rather than in black and white

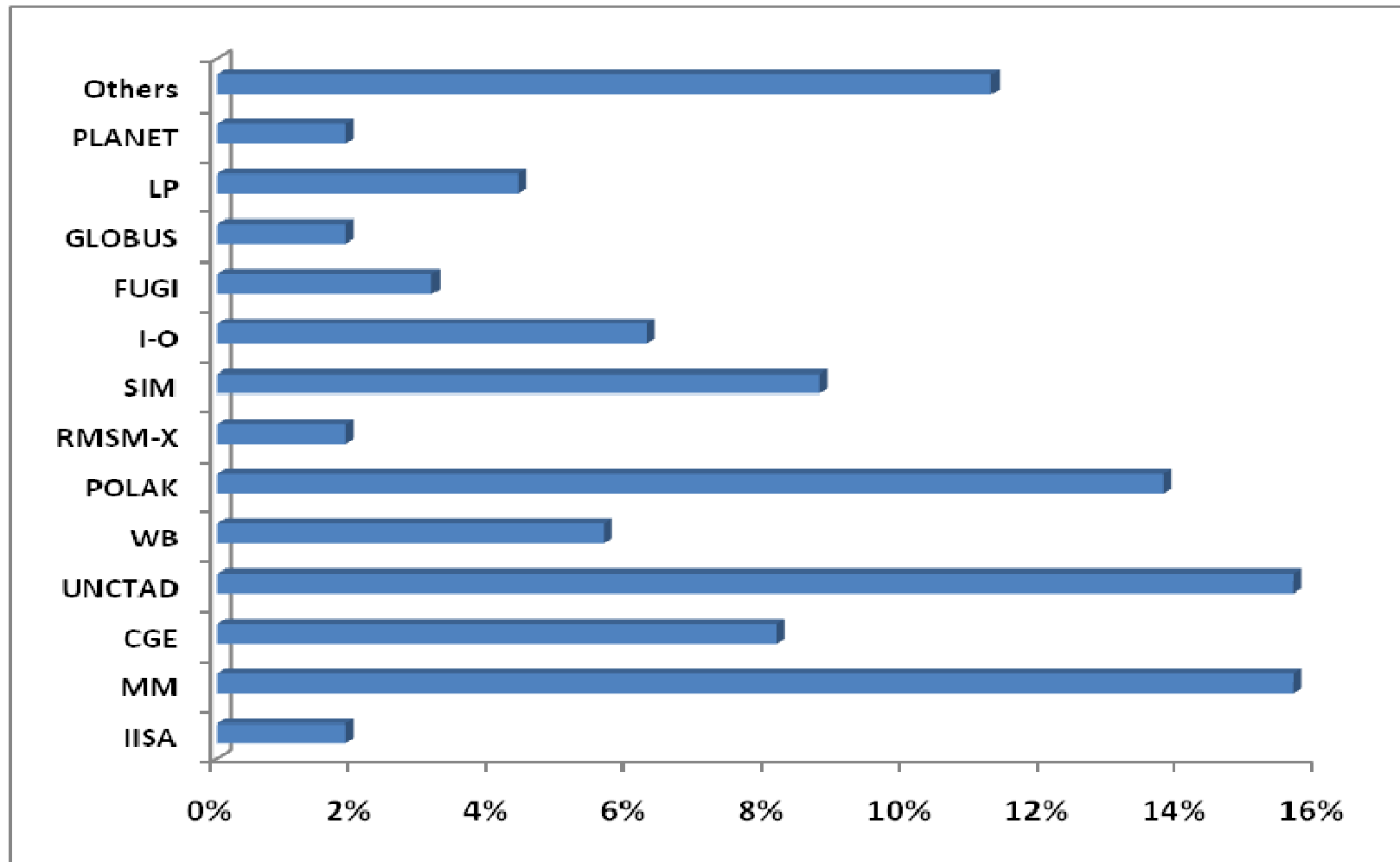
STATE OF AFRICAN MODELS

THE TYPOLOGY OF MODELS IN AFRICA

early stage of formal modelling in Africa (by generic grouping) as cited in Uebe, (1995), shows that about 160 models were used in Africa between the periods 1964 to 1994.

- FUTURE OF GLOBAL INTERDEPENDENCE (FUGI)**
- SYSTEM OF INTEGRATED MODEL (SIM)**
- GENERATING LONG-TERM OPTIONS BY USING SIMULATIONS (GLOBUS)**
- REVISED MINIMUM STANDARD MODEL EXTENDED (RMSM-X)**
- LINEAR PROGRAMMING (LP)**
- INPUT OUTPUT MODEL (I-O)**
- MACROECONOMETRIC MODELS (MM)**
- COMPUTABLE GENERAL EQUILIBRIUM MODEL**
- IMF/POLAK MODEL**
- WB/RMSM**
- UNCTAD**
- PLANET**
- INTERNATIONAL INSTITUTE FOR APPLIED SYSTEM ANALYSIS (IIASA)**

T TYPOLOGY OF MODELS USED IN AFRICA



Source: Classification was based on information from <http://www.unibwhamburg.de/uebe/modelle/titelseite.html>

STATE OF AFRICAN MODELS

■ **THE TYPOLOGY OF MODELS IN AFRICA**

- apart from Namibia, Papua New Guinea, Rwanda and Samoa New Guinea all other African countries surveyed have used a macromodel.
- these models were mainly developed by international organizations and development partners like (WB), (IMF), (UNCTAD), (OECD); and other few models from developed countries' MDAs
- a major characteristics of these models is that they were replicated across countries without due considerations to countries peculiarities. Examples:
- the Futures of Global Interdependence Model (FUGI) used in Algeria was also used for other countries like Bahrain, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, United Arab Emirates and Venezuela.

STATE OF AFRICAN MODELS

■ **PROBLEMS WITH THESE MODELS**

- aside the problems of model replication and duplication across countries they also suffer from:
- insufficient sample size, multicollinearity, misspecification and defective both in terms of addressing many of the policy questions that policy makers care most about Soludo, (2002) and Valadkhani, (2005)
- it is impracticable to rely on imported models whether in Africa or elsewhere because two economies rarely exhibit the same structure

STATE OF AFRICAN MODELS

■ RISING TO THE CHALLENGES – THE UNCOVERED GROUNDS

- While African countries would be said to have risen up to the challenges of having domestically designed macromodels. At least today we can boast of NPC, CBN, CEAR, SARB-MM etc. There are still immense challenges.
- Data availability
- problems of data update/database management
- obsolescence of models due to the non-availability of high frequency data, and hence their failure in policy analysis and forecasting
- model complementarity vs model substitutability – we need portfolio of models
- political expediency vs economic rationality - political interference and acceptability of models
- Do we align African economy to theory or structure of the economy – controlling for Africa's eclectic economy
- Regular model update

CAN WE RELY ON MODELS TO RESHAPE AFRICA'S FUTURE?

■ **WHAT MODELS OUGHT TO DO VS WHAT MODELS DO**

- The long years of history of macroeconomic modelling and its acceptance has not reduced the skepticism about the usefulness and performance of many of these models in policy making and analyses.
- It is often a big debate tracing what macromodel is “supposed to be doing and what it is actually doing”
- These questions bother on the understanding of the economic structure to be modelled, the theoretical versus eclectic models, the changing structure of economies, political acceptability of these models and the inability of existing models from forecasting the future
- The catastrophe and policy summersault of economies that rely on theoretical macromodels is traceable to the fact that such models rather than represent the uniqueness of every economy sees all economies as having the same characteristics.

MACROECONOMIC MODELS AND THE STORY OF THE ANIMAL FARM

❖ **MODELS HAVE FAILED AND WILL CONTINUE TO FAIL**

- ❖ From Adaptive Expectation (AE) to Rational Expectation (RE) – has anything changed?
- ❖ From theoretical-based models to *a theoretical/structural* models – are we better-off?
- ❖ “Standard macroeconomic models have failed, by all the most important tests of scientific theory: They did not predict that the financial crisis would happen, and even when it did, they miscalculated its effects and provided little guidance on how to respond” - *Stiglitz in August, 2011.*

ACTUAL AND IDEAL IMPACT OF MODELS

■ **WHO IS TO BLAME WHEN MODELS FAIL?**

- the idea that every model should rely at least in principle, or known theory left much to desired and continue to generate controversies as at what macroeconomic models do to economy policy making.
- in an attempt to possibly resolve this economy-model lock jam, models continue to emerge with each leaving more questions than it answered.
- the reliability of the optimal economic policy is dependent on how much the model is able to replicate and mimic the intended economy and the explanatory power of the designed model.
- since models work from abstraction to real life it is almost near impossible to perfectly replicate an economy

MACROECONOMETRIC MODELS - USEFUL?

- Yes, macromodels failed in some instances; and so what? Does that mean that science has failed? Should we criticize the models as useless?
 - Should we stop building models?

“No. There are two uses of models. One is to understand how the world works, another is to make predictions about the future. We may never be able to predict earthquakes far enough in advance and with enough specificity to allow us time to move to safety before they occur, but that doesn't prevent us from understanding the science underlying earthquakes. Perhaps as our understanding increases prediction will be possible, and for that reason scientists shouldn't give up trying to improve their models, but for now we simply cannot predict the arrival of earthquakes” –
the Economists view, 2009.

OVERCOMING OUR FEARS ABOUT FAILURE OF MODELS

The biggest question to help us overcome the fear that models will fail is: can models replicate the unknown?

- ❑ Models cannot completely replicate the economy but some acceptable degree of efficiency is required
- ❑ The accuracy or otherwise of modelling an economy is dependent on the ability of the Modeller to perfectly or near perfectly replicate the economy he/she is mimicking
- ❑ Information/knowledge, tools and method available to the Modeller are vital.

ACTUAL AND IDEAL IMPACT OF MODELS

■ SINCE THEORETICAL MODELS HARDLY REPLICATE STRUCTURE OF AN ECONOMY; WHAT NEXT?

- in practice the impact of macroeconomic models is to augment human judgment in understanding the virtual economy.
- Theoretical model adjustment based on human knowledge is required. This can be done by:
 - a) values of the exogenous variables driving the model must be estimated, based on the Modeller's best guesses of government policy actions, foreign economic activity, and other factors external to the model.
 - b) individual equations may be adjusted to compensate for the persistence of errors over time, and
 - c) if the forecast based on the estimated exogenous variables and the add-factors appears unreasonable to the Modeller, then additional subjective adjustments are made in the equations and/or the exogenous variables until a reasonable forecast emerges; see Mcnown, (1986)

ACTUAL AND IDEAL IMPACT OF MODELS

We can comfortably reclassify them from “what to how”. Basically there are two inputs into how to use human knowledge:

(1) market participation (MP) – information economics, and

(2) model calibration

■ under MP economic forecasting is achieved by combining mathematical models with knowledge of the market or the behaviour of economic agents, while

■ calibration involves the assignment of values to represent an estimated parameter and it requires an a priori knowledge of the variable of interest

CONCLUSION

- There is need to draw a line between the practice of models and model ideals. What model does is dependent on who is designing it and what it is intended to achieve. Thus, for full realization of the potentials of macroeconomic models in Africa, theoretical foundation as well as knowledge of the economy is required.
- This combination will produce a complete model for African economies. And the more complete a model is the more complex it becomes in explaining the structure of the given economy and the greater is the consistency in carrying out internal adjustment in the equations or variables in forecast calculations.
- we suggest a complete African model that incorporates a higher proportion of economy's peculiarity than a complete theoretical inclination

CONCLUSION

- Avoid the temptation of using one model to answer every economic question – no model “answereth” all things
- We should not be ashamed of developing *a theoretical* African models as long as they can give us acceptable knowledge of dynamic and versatile nature of African economy.
- Justification and domestications of these models are required for future consistency and reliability checks.
- To achieve this we need to overcome our fear that models will fail or have failed
- Finally, there is need for constant and consistent model refinements; and more importantly

THANK YOU

