Research Methods: Keys for writing high levels papers

KNOWING THE TYPE AND DIRECTION OF YOUR RESEARCH IS WAY FORWARD TO KNOW WHICH SPECIFIC METHODS TO BE EMPLOYED.

BY J.P. NAMAHORO

Why method is so important? My observation on methodological deficiency In Paper

- **I am a reviewer in some journals: Most papers I reviewed were questioned by method section.**
- **Some have rejected due to lack of good methods**
- **Some of my papers have rejected due to lack of new methods or enough of methods justification.**
- **Some of your papers are going to rejected due to this issues**
- **What are you going to do? Think about it**

Some examples: reviewer's comments on methods

2. The link between health expenditure and other variables should be analyzed by using different approach, especially the recent estimators. introduction and literature sections should be improved, here are the most important article to support the introduction and literature review sections for the case of carbon emission reduction:

4. The section does not present the gaps from the existing studies.
5. In the methods section, all applied methods are too old with several limitations. Author(s) should consider the recent methods such as NARDL, CS-DL, CCMG, and others.

Methodology

Why should we believe that the CS-DL and CCEMG model is better than other procedures in addressing the research question? Any competing baseline model against which to compare the results?

in my view, it should be done an effort in implementing a panel STR model to get a final

3. Theoretical framework is missing in the current version of the manuscript. Please provide Theoretical framework based on existing theories before the model.

4. I strongly suggest to check unit root of the study variables with another second-generation unit root method.

2-If the nonlinear ARDl test is to be applied, the confirmatory analysis in the context of the ADF, PP, and KPSS can not be preferred for the unit root test. But KSS test must be applied. Please applied and exhibited the results.

3- It is necessary to compare the results in the Causality test. Nonlinear causality tests/ should be preferred in this context. Results should be compared by choosing nonlinear causality tests. Especially Kyrtsou and Labys (2006) results and Hiemstra and Jones (1994), and Bai nonlinear causality tests should be used. See for Kyrtsou and Labys (2006) results and Hiemstra and Jones (1994),

3. The methodological section is poorly described with undefined methods such as wavelet. Some tests for testing the statistical significance of long-run and short-run effect in NARDL model, and others used methods were not explained in method section.

Content

- Theoretical and conceptual frameworks:
  - Theory, Hypothesis,
  - variables interaction,
- Research types and relevant methods

Technical terms

- **Methodology** is the assembly of methods used to achieve the desired conclusions.
- **Methods** are the various of models, either mathematics or any other techniques can be followed to overcome certain challenges.
- **Model** is the mathematical expression of an idea, theory, or a set of ideas, imaginations, designs, ….
- **Mathematical expression** is the connection of meaningful variables that makes explain the event or phenomena.
- **Variables:** A set of points, values, ….
- **Value**: any constant number that represent anything.

What is a theory and hypothesis

Theory

- A theory is a principle used to explain a phenomenon or occurrence with supported data. Theories are well-established explanations often accepted by a wide group of scientists and researchers because of the results of multiple tests and experiments.
- Theories can help society describe aspects of the natural world. An example of a theory is Albert Einstein's general relativity theory, which describes the law of gravitation and its relationship to other natural forces.

Hypothesis

- A hypothesis is a proposed explanation used to describe a phenomenon or occurrence. These are often assumptions made prior to completing research about the relationship between multiple variables.
- A hypothesis often occurs after the question and observation of a scientific method. For instance, if you observe your laptop charger isn't working, you may ask yourself, "Is the power out?" You can then create a hypothesis that if the power is out, then turning on the electrical breaker can help your laptop charger work again.

Theoretical framework

- Researchers use theoretical frameworks to explain the theories they're using within their research and provide their own research with context by identifying the assumptions that inform their work. A theoretical framework is often integrated into a literature review section near the beginning of a paper or experiment but can also be included as its own chapter or section.

Here's how to create a theoretical framework for your study

- 1. Define your objective
- 2. Write a problem statement
- 3. Present your research questions
- 4. Create a literature review to highlight relevant theories
- 5. Setting hypothesis
- 6. Connect variables

Definitions of terms	Explanations of theories	Logical connections
This helps to identify key concepts and define any uncommon terms, phrases or words in your document to provide a basis of understanding and a point of reference for the reader.	Your theoretical framework should provide an explanation for each of the theories you plan to utilize and show how they relate to your research.	A theoretical framework should connect concepts, terms and theories logically so they're easy to read and understand. This can also help support your theory during scientific questioning and testing.

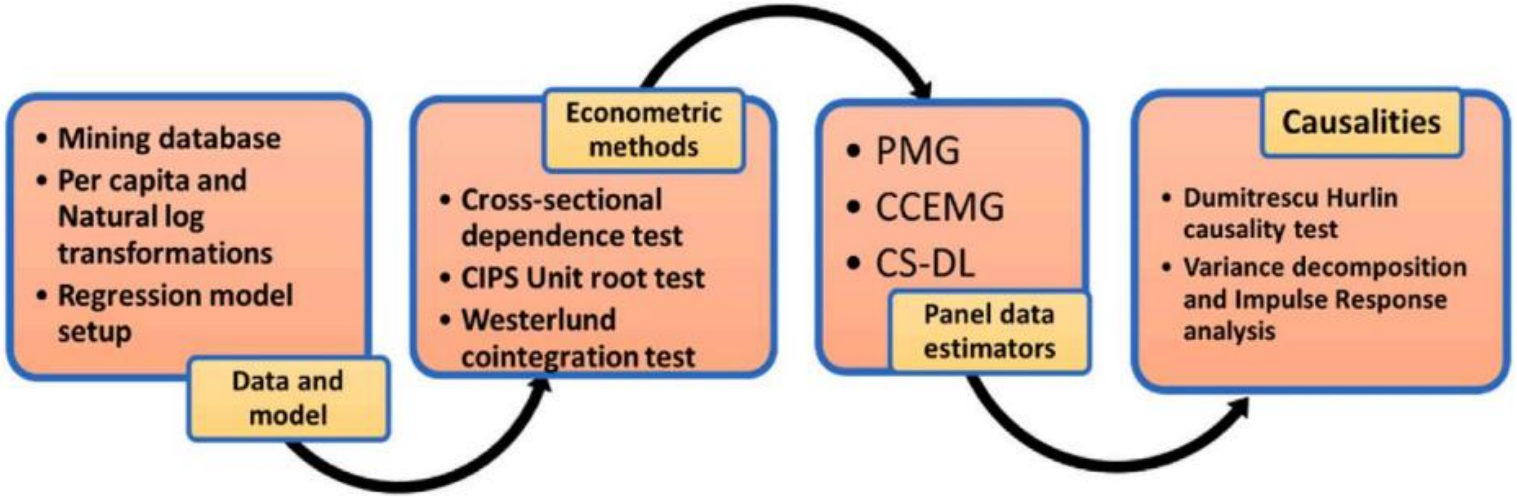
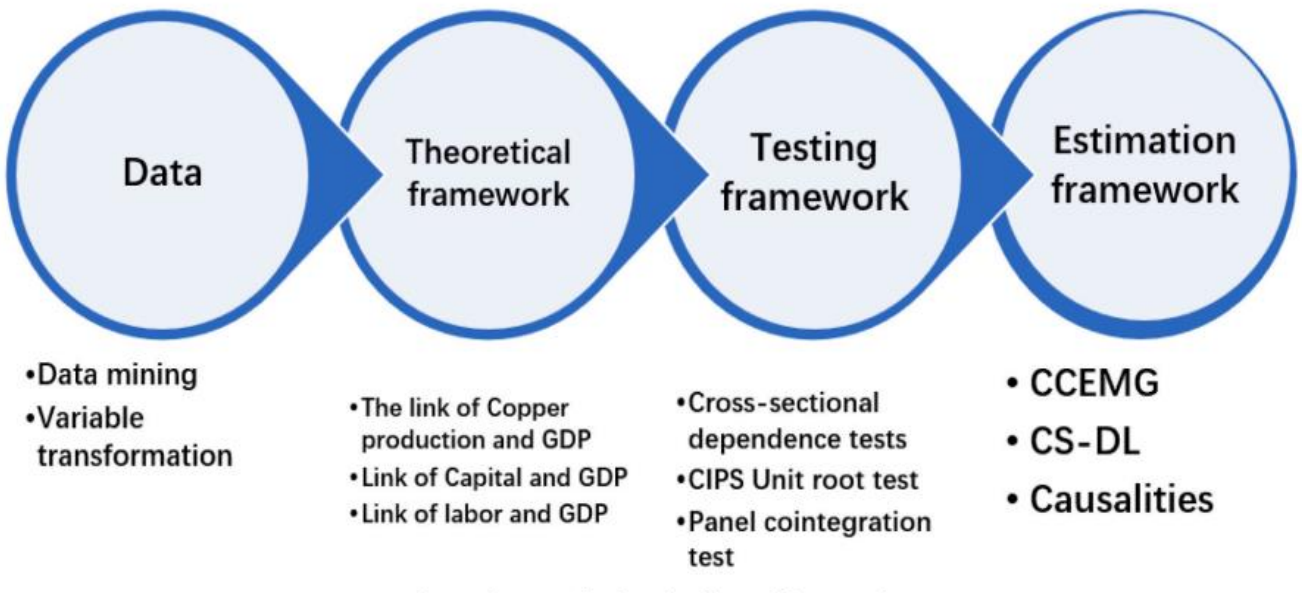


Fig. 2. Methodological flowchart.



Different Types of Research Methods

Primary Research and Sources

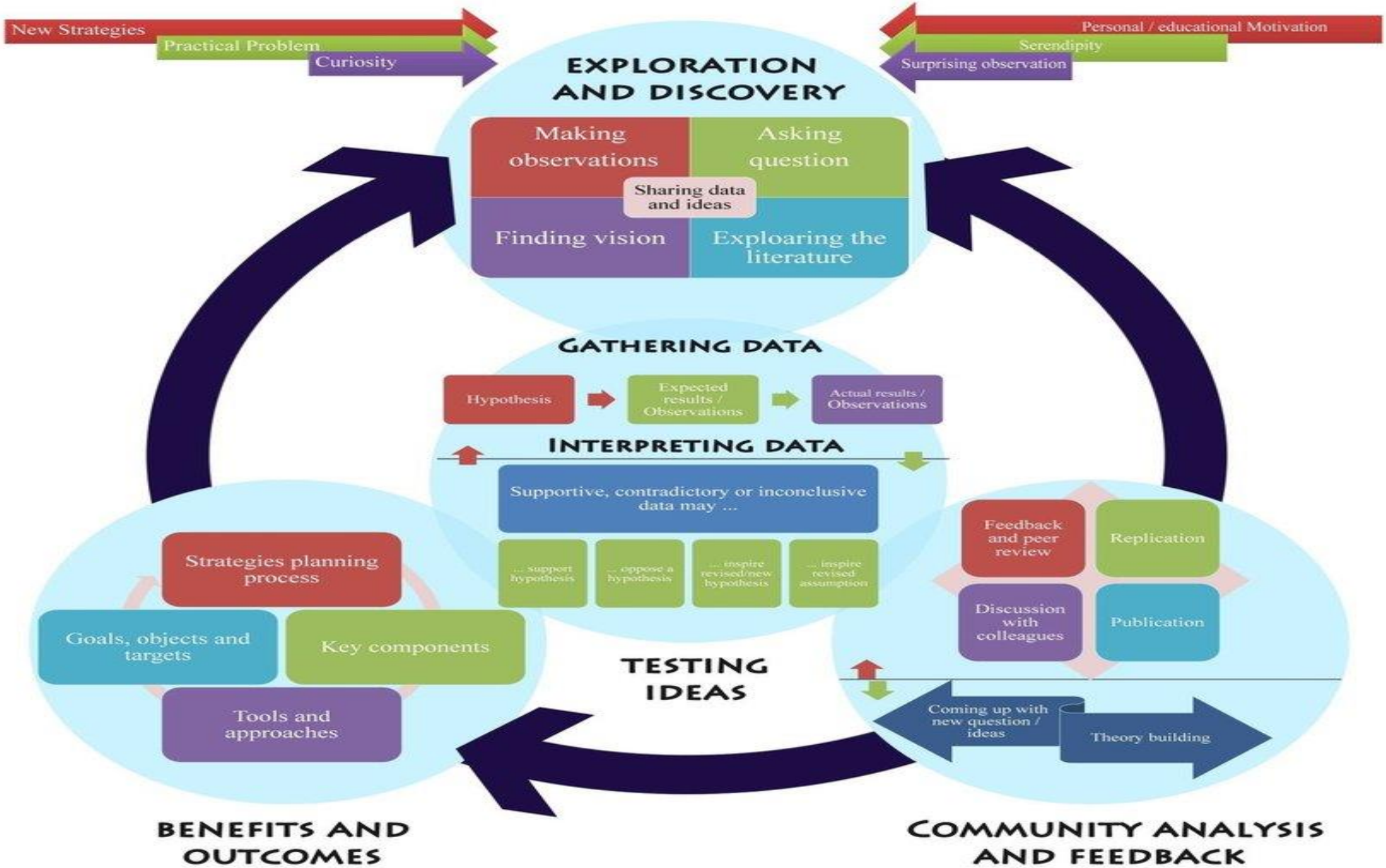
- *Primary research*-study of a subject through first hand observation and investigation:
  - analysing a workplace, conducting a survey or an interview
  - carrying out a laboratory experiment, building apparatus
  - analysing a literary or historical text, a film or performance
- *Primary sources* of information include statistical data, historical data, works or art...

Secondary Research and Sources

- ***Secondary Research***- involves the examination of studies of other researchers
- ***Secondary Sources*** include books, articles about political issues, medical issues, scientific debates or literary works

Most research and most research writing involves the use of both forms of research and both forms of research sources

- broadly speaking there are two major types of research models or ***research paradigms*** (after Creswell 2003):
  - ***quantitative***- also known as traditional, positivist, experimental, or empiricist as advanced by authorities such as Comte, Mill, Durkheim, Newton, Locke
  - ***qualitative***- constructivist, naturalistic, interpretive, postpositivist or postmodern perspective as advanced by Dithey, Kant, Wittgenstein (latter), Foucault, Miles and Huberman


New Strategies
Practical Problem
Curiosity
Personal / educational Motivation
Serendipity
Surprising observation
EXPLORATION AND DISCOVERY
Making observations
Asking question
Sharing data and ideas
Finding vision
Exploaring the literature
GATHERING DATA
Hypothesis
Expected results / Observations
Actual results / Observations
INTERPRETING DATA
Supportive, contradictory or inconclusive data may ...
... support hypothesis
... oppose a hypothesis
... inspire revised/new hypothesis
... inspire revised assumption
Strategies planning process
Goals, objects and targets
Key components
Tools and approaches
TESTING IDEAS
Feedback and peer review
Replication
Discussion with colleagues
Publication
Coming up with new question / ideas
Theory building
BENEFITS AND OUTCOMES
COMMUNITY ANALYSIS AND FEEDBACK

Other Research types

- **Descriptive Research:** This form of research is focused on describing the prevailing state of affairs as they are. Descriptive Research is also termed as Ex post facto research
- **Analytical Research:** Researcher has to make with the data and factual information available at their behest and interpret this information to undertake an acute evaluation of the data.
- **Applied Research:** The crux of Applied Research is to figure out the solution to a certain growing practical issue. Here there is three types of research: Evaluation Research, Research and Development, and Action Research
- **Fundamental Research:** This is a Research type that is primarily concerned with formulating a theory or understanding a particular natural phenomenon.

Methods

- These research methods can be adopted for approaches like descriptive, correlational or experimental research.
- **Descriptive – Analyze** The study variables by using visualization tools
- **Correlational -** The relationship between the study variables is analyzed.
- **Experimental -** It is deciphered to analyze whether a cause and effect relationship between the variables exists.

Quantitative research methods

- **Experimental**- This method controls or manages independent variables for calculating the effect it has on dependent variables.
- **Survey** - Surveys involve inquiring questions from a certain specified number or set of people either online, face to face or over the phone.
- **(Systematic) observation** - This method involves detecting any occurrence and monitoring it in a natural setting.
- **Secondary research** : This research focuses on making use of data which has been previously collected for other purposes such as for say, a national survey.

Qualitative research methods

- **Observations**: In this method what the researcher sees, hears of or encounters is recorded in detail.
- **Interviews**: Personally asking people questions in one-on-one conversations.
- **Focus groups**: This involves asking questions and discussions among a group of people to generate conclusions from the same.
- **Surveys**: In these surveys unlike the quantitative research surveys, the questionnaires involve extensive open ended questions that require elaborate answers.
- **Secondary** : Gathering the existing data such as images, texts or audio or video recordings. This can involve a text analysis, a research of a case study, or an In-depth interview.

Steps for data analysis

- 1. Determining the objective
- 2. Gathering the data
- 3. Cleaning the data
- 4. Interpreting the data
- 5. Sharing the results

Preliminary techniques for Quantitative and Qualitative researchers

Sampling theory

- Sampling Distribution
- Distribution of the sample mean x
- Distribution of Sample Proportion (ˆp)
- Estimation of population parameters
- Sample Size Determination

Sampling methods

- Random Sampling Schemes
- Simple random sampling,
- Systematic Random Sampling
- Stratified Random Sampling
- Cluster Random Sampling,
- Two-stage Sampling

Research Models

Theories, Methods, Domains & Methodologies

- research models (paradigms) are applied to *understanding particular application domains* (also known as a problem domain) *by means of deploying methods which have behind them particular theories* (next section …)
- research models (paradigms) are *deployed using one of a number of recognised research methodologies*- the choice is largely a matter of discipline- what counts as a useful methodology within a particular area (following section …)

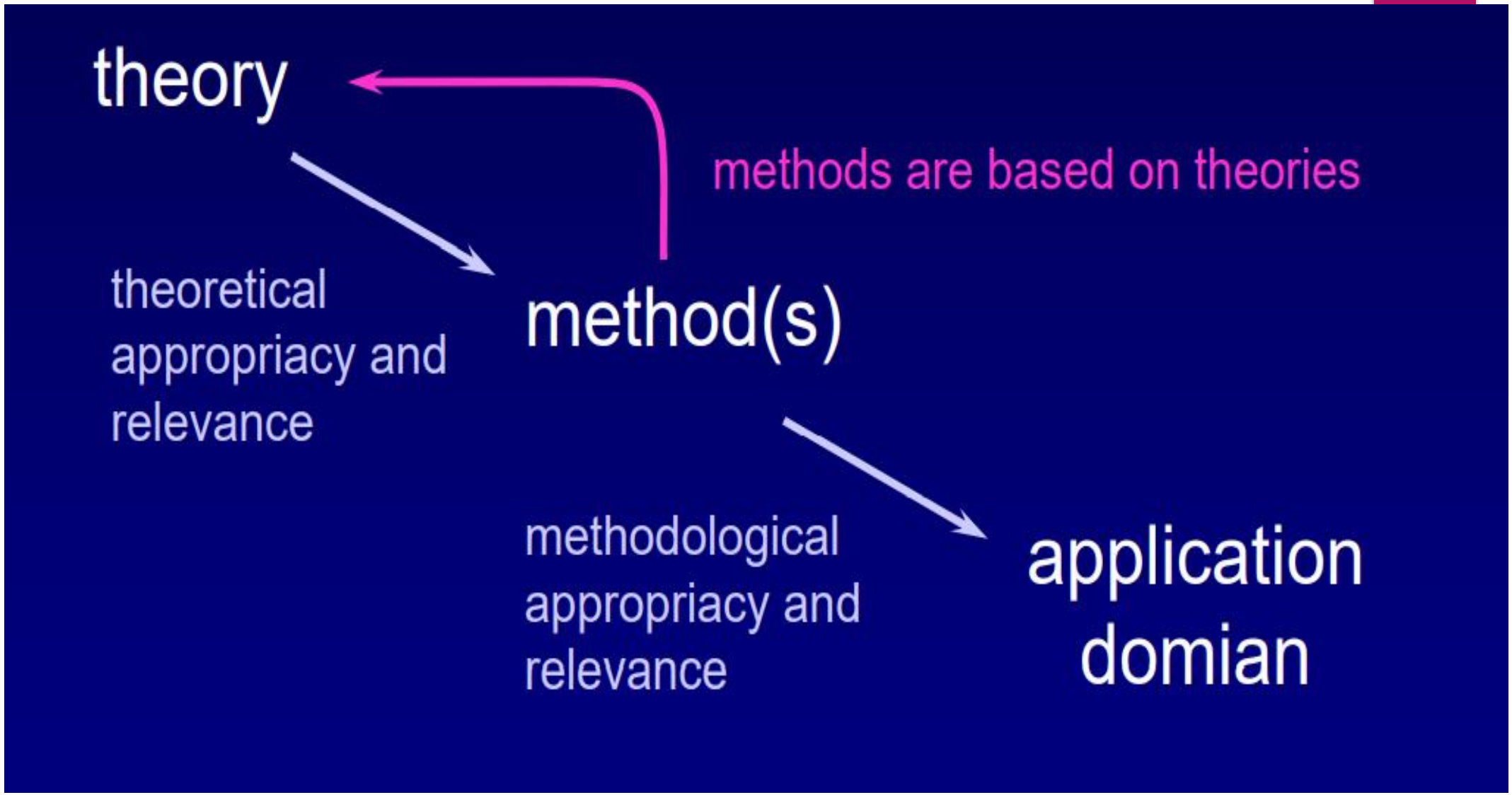
Theories, Methods, Domains *(3)*
Relationship between Methods and Theories

- in order to know the range of available methods that can be selected- ***you must know about the theory being applied***
  - an important issue involves realising that ***behind every method there is always a theory***
  - ***theories also need to be checked*** for appropriacy and relevance with respect to a given application domain

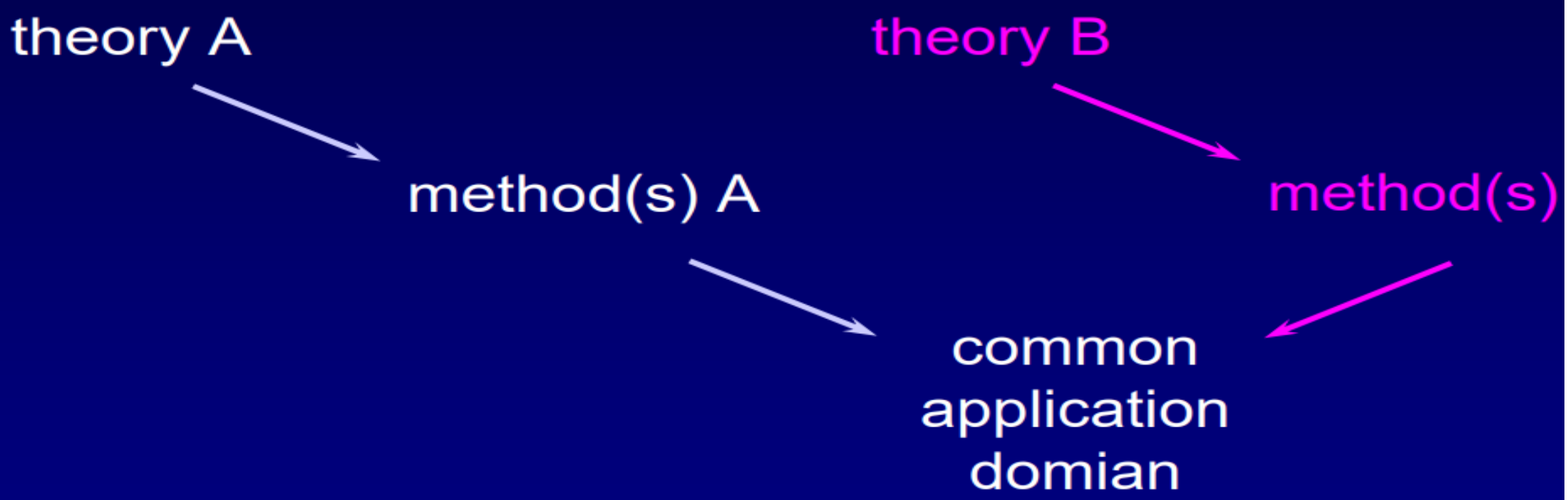
Theories, Methods, Domains *(6)*

Putting Theories at Risk

- in severe cases the application of methods to a particular domain can put the ***theory at risk***
- can be manifest in several ways and may involve:
  - ***major projects to revamp theories*** to account for the special conditions, or
  - ***the use of additional theories*** to account for these special conditions
- real researchers look for these occasions- it often means you can get a substantial part of your original argument (and your PhD!)


theory
methods are based on theories
theoretical appropriacy and relevance
method(s)
methodological appropriacy and relevance
application domian

Theories, Methods, Domains



Examples of some estimation techniques and models

- OLS methods (Ordinary Least Square method)
- FMOLS (Fully Modified Ordinary Least Square)
- DOLS (Dynamic Ordinary Least Square)
- CCEMG
- MG
- PMG
- etc

3.3.4. *Panel cross-sectional augmented distributed lags (CS-DL)*

Due to this study uses panel data, which are mostly suspected to have cross-sectional dependence across countries, the panel CS-DL test proposed by Chudik et al. [66] has employed. This test allows and estimates the effect of the possible cross-sectional lags and cross-sectional average variables on the variable of interest. Thus, the CS-DL equation can be written as follows:

$$y_{it} = \alpha_i + \beta_i y_{it-1} + \delta_{0i} x_{it} + \delta_{1i} x_{it-1} + \sum_{l=0}^{PT} \sigma_{il}^{'} \bar{z}_{it-l} + u_{it} \tag{13}$$

For $i = 1, 2, \ldots, N$, and $\bar{z}_t = N^{-1} \sum_{i=1}^{N} z_{it} = (\bar{y}_t, \bar{x}_t, \bar{f}_t)^{'}$, where β_0 and δ_0 obtained by arithmetic averages of least squares estimators of β_i and δ_{0i} based on the Pesaran (2006) [61], and f_t is the unobserved common factor with heterogeneous factor, α_i and u_{it} are intercept and error term. The long-rung coefficients can be estimated in this equation:

$$\widehat{\theta}_{cs-DL} = \frac{\sum_{l=0}^{q} \widehat{\delta}_{il}}{1 - \sum_{l=1}^{p} \widehat{\beta}_{il}} \tag{14}$$

3.3.5. *Common correlated effect means groups (CCEMG)*

The panel CCEMG proposed by Pesaran (2006) [61] and extended by Chudik et al. (2015) [67] and Pooled means group proposed (PMG) by Pesaran et al. [74] have also used in this study. The CCEMG estimator estimates the effect of cross-sectional average regressors on the variables of interest. This is the unique feature that makes CCEMG better than the previous versions, which assume the cross-sectional effect. CCEMG can be estimated in the following equation.

$$y_{it} = \alpha_i + \sum_{l=0}^{p} \beta_{il} y_{it-l} + \sum_{l=0}^{q} \delta_{il} x_{it-l} + \sum_{l=0}^{Z} \mu_{il} \bar{z}_{it-l} + u_{it} \tag{15}$$

where $\bar{z}_t = (\bar{y}_t, \bar{x}_t)^{'}, \bar{y}_t = n^{-1} \sum_{i}^{N} y_t$ and $\bar{x}_t = n^{-1} \sum_{i}^{N} x_t$, for (p, q, z) are the lags.

$$\Delta \ln y_t = \beta_0 + \sum_{i=1}^{p} \beta_{1,l} \Delta \ln y_{t-l} + \sum_{i=0}^{q} \beta_{2,l} \Delta \ln REC_{t-l} + \sum_{i=o}^{q} \beta_{3,l} \ln A_{t-l} + \sum_{i=0}^{q} \beta_{4,l} \Delta \ln K_{t-l} + \beta_5 (\ln y_{t-1} - \rho_0 - \rho_1 \ln REC_{t-1} - \rho_2 \ln A_{t-1} - \rho_3 \ln K_{t-1}) + \varepsilon_t \tag{3}$$

Where Δ denotes the first difference, p, and q lags length selected by AIC selection criteria. To estimate (3) in one-step, examined by multiplying the error correction term out in the following model:

$$\Delta \ln y_t = \beta_0 + \sum_{i=1}^{p} \beta_{1,l} \Delta \ln y_{t-l} + \sum_{i=0}^{q} \beta_{2,l} \Delta \ln REC_{t-l} + \sum_{i=0}^{q} \beta_{3,l} \ln A_{t-l} + \sum_{i=0}^{q} \beta_{4,l} \Delta \ln K_{t-l} \tag{4}$$

If the series is seasonal with s periods per year, then a seasonal ARIMA (SARIMA) model can be written as

$$\Phi_p(B^s)\Phi_p(B)(1-B)^d.(1-B^s)^D(Y_t-\mu)=\theta_q(B).\Theta_Q(B^s)\varepsilon_t, \tag{1}$$

where

$$\Phi_p\left(B^S\right)=1-\Phi_1.B^s-\Phi_2B^{2s}-\ldots-\Phi_pB^{ps}, \tag{2}$$

with

$$\Phi_p(B)=1-\Phi_1B-\Phi_2B^2-\ldots-\Phi_PB^P \tag{3}$$

for $\Phi_p\neq 0$ and $\theta_q(B)=1-\theta B-\theta_2B^2-\ldots-\theta_qB^q$.

$\Theta_Q(B^s)=1-\Theta B^s-\Theta_2B^{2S}-\ldots-\Theta_QB^{QS}$ for $\Theta_q(B)\neq 0$, where Φ and Θ denote the polynomials B^s of P and Q, respectively. The most useful polynomial model for seasonal data is the SARIMA model of order (0; 1; 1)X (0; 1; 1) s for monthly data $s=12$.

This model can be given as

$$(1-B)\left(1-B^{12}\right)=(1+\theta(B))\left(1+\theta\left(B^2\right)\right). \tag{4}$$

2.2. Exponential Smoothing Model. When the model is not the ARIMA, then it can be an exponential smoothing model (ESM). By plotting time-varying data and because the series has neither trends nor seasonal components, the model becomes simple exponential smoothing (SESM). The SES model is written as $S_t=\sigma*Y_t+(1-\sigma)*S_{t-1}$ where S_t is a smoothed value for time t, a is a smoothing constant rise between 0 and 1, and $t=1, 2, 3$; for more details, see [26]. In the case, time-varying data contains a simple trend, and SESM becomes a double exponential smoothing model (DESM) and is used to solve the simple trends associated with two equations applied to estimate the parameter as follows:

$$S_t=\alpha Y_t+(1-\alpha)\cdot\left(S_{t-1}+b_{t-1}\right)\cdot 0\leq\alpha<1, \tag{5}$$

$$b_t=\Upsilon\left(S_t-S_{t-1}\right)+(1-\Upsilon)b_{t-1}\quad 0\leq\Upsilon<1, \tag{6}$$

Energy

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The impact of total and renewable energy consumption on economic growth in lower and middle- and upper-middle-income groups: Evidence from CS-DL and CCEMG analysis

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ABSTRACT

Among the literature that examined the total and renewable energy-growth nexus, few of them were conducted in low and middle-income countries, however, the total-renewable energy-growth nexus in the lower and middle–income countries at the regional and global levels has not discussed. In this respect, this study examines the impact of total and renewable energy consumption on growth at the global and regional levels across the low-, lower and middle-, and upper-middle-income groups for a sample of 75 countries from 1980 to 2016. The cross-sectional augmented Autoregressive distributed lagged (CS-DL) and common correlated effect means group (CCEMG) have been employed. The findings reveal that total energy is significantly and positively affects economic growth in three income groups; especially this effect is increasing concerning the level of income group, and renewable energy consumption positively affects economic growth at the global level. At the regional levels, the effect of total and renewable energy consumption on growth is mixed across the income groups. Furthermore, negative and neutral effects of renewable energy on growth are highly prevalent than those from total energy at the regional levels. Therefore, policymakers need to reflect on cause-led negative effects and set relative policies, which could attract investors in renewable energy projects so that renewable energy will positively affect economic growth in all regions across income groups.


Thank you for your kind attention