**About using %change variables**

In time series analysis, when you regress the percentage change in outcome on the percentage change in X, you are examining the relationship between the proportional changes in the dependent variable (outcome) and the independent variable (X) over time.

In this case, the percentage change in outcome and X are calculated as follows:

%change in outcome = (outcome\_t - outcome\_(t-1)) / outcome\_(t-1) \* 100 %change in X = (X\_t - X\_(t-1)) / X\_(t-1) \* 100

where "t" represents a specific time period, and "t-1" represents the previous time period.

By regressing the percentage changes, you are essentially modeling the relationship between the growth rates or the rates of change of the two variables. This approach can help eliminate the effects of scale and allow you to focus on the dynamics of the relationship between the variables. In this type of regression, the coefficient of the independent variable (%change in X) can be interpreted as the elasticity of the dependent variable (%change in outcome) with respect to the independent variable. This means that a 1% change in X is associated with a coefficient times 1% change in the outcome, holding other factors constant.

Using the percentage change regression method can indeed be a useful approach when dealing with panel data that includes multiple countries, particularly when their data are not on the same scale. By focusing on the percentage change or growth rates, you eliminate the effects of scale and concentrate on the dynamics of the relationship between the variables across countries.

Some advantages of this approach include:

1. Comparability: Transforming the data into percentage change allows you to compare the relationships between variables across countries, regardless of the differences in scale or the level of the variables.
2. Elasticity: The coefficients in this regression can be interpreted as elasticities, which provide meaningful and intuitive insights into the relationships between variables.
3. Stationarity: In some cases, transforming data into percentage changes can help achieve stationarity, which is an important assumption for certain time series and panel data models.

However, keep in mind that there might be some challenges and limitations with this approach:

1. Loss of information: By transforming the data into percentage changes, you might lose some information about the level of the variables, which can be important in certain analyses.
2. Possible distortion: Extreme values, outliers, or zero values in the data might lead to distortion in percentage changes, potentially affecting the regression results.
3. Panel data considerations: When working with panel data, you might also need to account for other factors, such as fixed or random effects, to control for unobserved heterogeneity across countries.

**About choosing the outcome variable**

In order to compare the variation of variables with different scales, you can use the coefficient of variation (CV). The coefficient of variation is a dimensionless measure of relative variability that is calculated by dividing the standard deviation (SD) of a variable by its mean (µ):

CV = (SD / µ) \* 100

By calculating the CV for each variable, you can compare their relative variation and choose the one with the highest CV as the variable with the most variation.

**About country fixed effects**