Script

Good afternoon, the title of my project is: Accounting for education enhancement effects on population growth dynamics: A wealth gap perspective

Why this research question? Classical macroeconomic approaches often resort to already built frameworks in order to model the explanatory behaviour of unemployment, inflation or any other measure of one could care for. These models are evaluated with econometric techniques based on empirical data with the fundamental objective of unfolding and predicting subsequent economic performance. However, there is one component common to all of these models which is usually not subject of study and it is usually taken as a constant: the population growth rate. These are two examples of well known macro-economic models, the solow model and the ramsey model which involves endogenizing the savings rate. Both of them contain the parameter “n” but this is endowed with an exogenous characteristic. This is why I found it interesting to study this a bit deeper.

In addition to this, I wanted to escape from typical economic research on the relationship between population dynamics and GDP or labour force and rather give this a more original approach. My final goal is to estimate the causal effect that education improvements can have on levels of population growth rate. Enlarged labour force or shifts in aggregate demand are both linked to the notion of population growth rate, thus impacting in a desirable way economic prosperity as well as many other variables, this means I have to go through a thorough process of thinking about potential confounders and explanatory variables. Another source of relevance to this study is that empirical evidence suggests that advanced economies are undergoing a process of stagnation in terms of population dynamics whereas pre-industrialized economies experience huge birth rates.

My hypothesis holds that education enhancement is strongly linked with the notion of family planning, sex education and female labour participation which eventually gives rise to birth control and gender parity. This brings us to the following research questions: What is the impact on population growth of education level? Does this effect differ across continents/economies? What policies can public entities resort to in tackling such an issue?

My intention is to perform a dual analysis (e.g. splitting our task into a continental dimension). According to Population Council researcher Mark Montgomery, boundless drops in fertility rates were immediately observed when developing countries revised their educational performance in the 70s. Dealing with a problem of overpopulation requires public policy intervention which, as an earlier step, needs a deep understanding of the treatment variables. So, the relevance of this study lies on the potential contribution to the broader topic of population dynamics and public policies which is one of the major threatening issues to many economies.

The paper will be split in 3 main sections. In the first one I plan to construct an econometric model to predict population growth rate as a function of education level and accounting for potential differences by continents and regions. My idea is to test for the hypothesis of identical marginal effects by replacing in the original equation our restriction and resorting to an F-statistic on the sum of squared residuals. I’m still on the process on building the model because I first need to analyse well the data to make decisions on power terms, interaction terms etc

In the second section we will build a predictive model to estimate when a country is likely to experience negative population growth rates, this is centered in economically developed economies. We will compute the marginal effect on contributing to the probability of driving into the region of negative growth rates. We expect concave relationships between our variables and the marginal effects due to the model election. At this stage of our analysis, one will notice the fact that approximately 90% of the database holds a positive population growth rate, hence the challenge faced is to be able to maximize assessment metrics on precision and sensitivity.

And finally, I will compare these two models with a time series model in which I will hypothesize for an autoregressive component of population. This means that, if we assume that population growth at time t depends on previous results at t-1, then there is this autoregressive component which depends on the lagged variable. For this model I think I will need to use an additional econometric software, I am still talking to my supervisor Regina on this issue.

In the end I want to compare these 3 models and check for the best one in terms of accuracy and precision of predictions.

I have included this last slide containing the variables I am planning to use for the research. Data should be temporal if I want to account for causal relationships and I have included gdp growth rate and population growth rate just as the economic models we saw earlier.

I´m still not sure how to include GDP growth rate in the model since it could be the case that this could affect the quality of education and at the same time have an effect on population growth rate, so more like a classical confounder or it could happen that both education and population structure affect this variable, therefore being more of the side of a collider bias.

Then there are some geographical variables such as the continent or latitude and longitude. I have also included some demographic attributes such as migration, life expectancy or median age because I believe these are all potential confounders if I want to explain population growth rate. I have decided to go for median age instead of mean age because the median is a more robust measure and it gives information about the middle point observation. In order to measure education I have included number of years of schooling and public investment in education as which I have to decide how to group in a single variable, I was thinking in applying some weighted average. I may include additional variables to account for education quality in the future.

Finally, I have also a variable on religious identity which measures the importance of religion by country, this information is obtained through a survey done by the International Religious Demographic Project and a variable on civil rights which is categorical. I think that these variables should be included in the model because we might find that very conservative and religious countries are more strict on gender equality issues, abortion laws or promoting higher education which in the end has an impact on fertility rates. Or it could be the opposite case, In India, the most learned men and women of ancient times were residents of Buddhist and Hindu monasteries. In the Middle East and Europe, Christian monks built libraries and preserved important writings produced in Latin, Greek and Arabic. In many cases, these religious monasteries evolved into universities. Whatever the direction of bias, these variables should be included.