

## A somewhat lengthy reply to @cubic\_logic

After commenting on a [post](#) by [@GreekAnalyst](#) that the return of the unemployment rate to the pre-crisis level is not a success if you consider that the labor force in the country decreased by about half a million people, roughly 10% decrease since 2008, [@cubic\\_logic](#) claimed that the decrease of the labor force is primarily due [low birth rate and the shift of the age pyramid](#) and that [population flows in and out of the country contributed marginally](#).

I have not been able to find accurate data concerning population inflow-outflow for Greece for the past 20 years. So I decided to perform the following order of magnitude calculation (a typical obsession in experimental Physics).

The population in 2008 was [11 million](#) ( $N' = 11 \times 10^6$ ). The [birth](#) and [death](#) yearly rates were pretty flat since the 90's and in the five year period 2003-2008 (before the economic crisis) had mean values of 9.34 and 9.9 per 1000 inhabitants respectively. So we get a negative yearly growth rate of -0.56 per 1000 people ( $r = -0.56 \times 10^{-3}$ ). Plugging these numbers to the [equation](#)  $N = N' e^{rt}$  and projecting for the next 15 years ( $t = 15$ , up to 2023) we get a population (N) decline of roughly 100k people. This relatively short-term order of magnitude estimation should be correct given a flat life expectancy, net zero emmigration flows and no major natural disasters. Total Covid deaths were about 37k people and did not substantially affect death rates. [Life expectancy](#) increased between 2008 and 2023 by almost 2.5 years thus nullifying the negative contribution of the pandemic in demographics. However this scenario **did not play out**. Between 2009 and 2023 we witnessed a more negative mean yearly growth rate of -2.27 ( $r = -2.27 \times 10^{-3}$ ) again derived from the same data sources. With this mean rate the population decline should have been 400k people.

Interestingly the population decline we get from [actual data](#) is ~750k people, almost twice the number of what we should expect given the reported birth/death rates. The only factor that is left to explain such a striking difference is a strong outflow of people from the country which contributes at least 50% to the observed decline of the actual labor force. This same conclusion is also reached by other studies found online [1][2]. Any objections always welcome..

[1][https://figshare.com/articles/journal\\_contribution/The\\_decline\\_in\\_the\\_number\\_of\\_persons\\_of\\_working\\_age\\_leads\\_to\\_a\\_shrinking\\_size\\_of\\_the\\_labour\\_force\\_in\\_Greece\\_in\\_Greek\\_/22147361](https://figshare.com/articles/journal_contribution/The_decline_in_the_number_of_persons_of_working_age_leads_to_a_shrinking_size_of_the_labour_force_in_Greece_in_Greek_/22147361)

[2] [https://www.businessdaily.gr/oikonomia/101364\\_giati-ehei-syrriknothei-kata-300000-atoma-ergatiko-dynamiko-stin-ellada](https://www.businessdaily.gr/oikonomia/101364_giati-ehei-syrriknothei-kata-300000-atoma-ergatiko-dynamiko-stin-ellada)

\*all data were taken from <https://www.macrotrends.net/countries/GRC/greece/> and can be seen by clicking the respective links