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Task 01

**Best practices for reproducible data analysis:**

* Make the effort to practice reproducible data analysis and do not fall victim to old habits.
* Practice good habits for reproducible data analysis from the start of every project.
* Use version control repositories when possible in order to keep track of project development as well as to establish a reproducible workflow. This is especially important with increasing numbers of collaborators and when there is parallel development of files.
* Ensure that there is a working prototype in an interactive computing environment (e.g. in Matlab) prior to starting work on production scale computing (e.g. in C or C++).
* Test code rigorously early on to prevent lengthy reanalysis of data later on. Early testing will improve code quality, provide a test case that can be used to improve documentation, and allow rapid identification of bugs.
* Write readable code that has descriptive naming, a logical structure, and comprehensive documentation. This will allow code to be understood, corrected, and modified with ease by collaborators as well as your future self.
  + Comprehensive documentation could include giving examples of how code might be used or reference published examples of how code has been used.
  + Continuous integration (CI) may be implemented in order to continually test code as it is updated.
  + Comprehensive documentation may be aided by documentation generation systems such as: LaTeX, HTML, Markdown, and rest.
* Share software, data, and knowledge with the scientific community in order to facilitate research that is reproducible and more thoroughly peer reviewed.

**The Reinhart-Rogoff affair:**

In 2010 the research article “Growth in a Time of Debt” was published by economists Carmen Reinhart and Kenneth Rogoff. This article examined the relationship between economic growth (GDP) and debt and found an association between countries where debt exceeds 90% of GDP and slow economic growth. However, a subsequent paper published by economists at the University of Massachusetts Amherst revealed errors Reinhart and Rogoff made in their Excel spreadsheet and that sans errors, GDP still grows (albeit at a slower rate) when debt is high. This revelation incited the Reinhart-Rogoff affair as “Growth in a Time of Debt” had been widely cited by politicians to advocate for and justify slashing budgets and government spending. This affair is a prime example of the importance of reproducible data analysis and open science. Had Reinhart and Rogoff employed reproducible data analysis in their work, their errors may have been caught sooner and prior to being published. Open science would also allow other greater opportunity to catch errors and improve Reinhart and Rogoff’s work earlier. This is especially important in this case as the relationship between economic growth and debt are politically charged and research in this area will have political consequences.

**Look at the chon\_rates.xlsx spreadsheet:**

No response required.