

## State debt and doubling time

The doubling time is calculated as 70 divided by the growth factor.

For example, to calculate the doubling time of a population that is growing at a rate of 10% per year, we simply divide 70 by 10 which equals 7 years. A population of 10,000 people today will reach 20,000 in 7 years' time and 40,000 in 14 years' time. At a constant growth rate of 10%, the performance variable has a constant doubling time of 7 years irrespective of its initial value.

### The case of French debt

In this exercise the growth factor is 5.76%. The approximate doubling time is  $70/5.76 = 12.15$  years. This means that France's debt will double in 12 years' and two months' time to over 4200 billion euros assuming that growth remains at the same rate.

### France's debt-to-GDP (Gross Domestic Product) ratio

France's GDP was 2181.1 billion euros at the end of 2015. It's debt to GDP ratio was 96.1% (debt = 2096.9, GDP = 2181.1). If GDP stays at the same level (it is growing at only 0.2% per year at present), France's debt to GDP level will reach over 190% ( $4200/2181.1$ ) by 2029.

### Two words of warning!

(1) The doubling time calculation assumes that **the performance variable keeps growing at the same rate**. This is not always the case.

For example, the European Commission recently projected that France's debt will remain stable until 2020.

(2) The formula that we have used here ( $70/R$ ) is an **approximation**. If we had used the exact formula, we would have found an answer of 12.38 (12 years and 4 months).

## References

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