Dr Florian Reiche
F.Reiche@warwick.ac.uk

1 | Testing the Classical Linear Assumptions

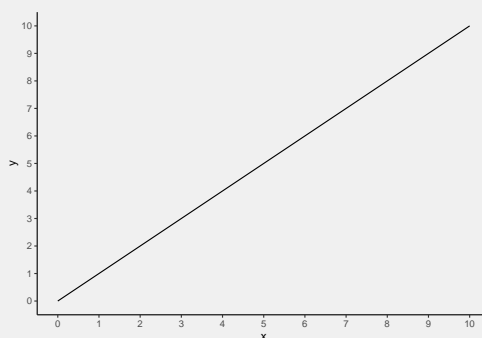see `RScript`.

2 | The Gauss-Markov Theorem

2. According to Malinvaud, the assumption that $E(u_i|X_i) = 0$ is quite important. To see this, consider the PRF: $Y = \beta_1 + \beta_2 X_i + u_i$. Now consider two situations: (1) $\beta_1 = 0$, $\beta_2 = 1$ and $E(u_i) = 0$; and (2) $\beta_1 = 1$, $\beta_2 = 0$ and $E(u_i) = X_i - 1$. Now take the expectation of the PRF conditional upon X in those two cases, and see if you agree with Malinvaud about the significance of the assumption $E(u_i|X_i) = 0$.

2.1 Situation 1

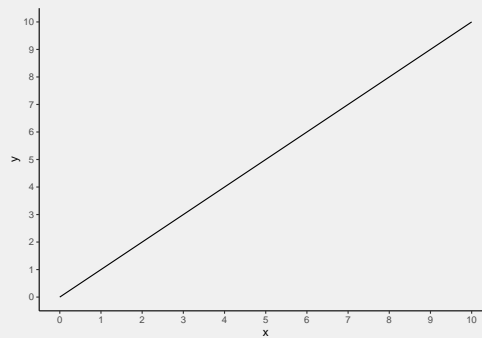$$Y = \beta_0 + \beta_1 X_i + \epsilon_i$$
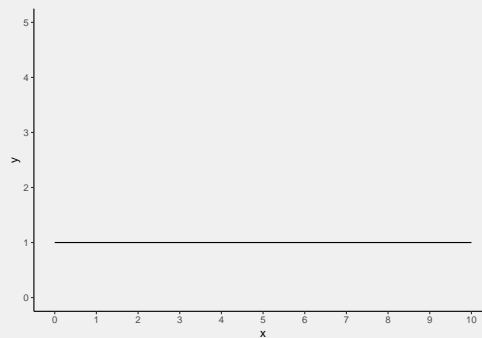
$$= 0 + X_i + 0 \tag{1}$$

$$= X_i$$

2.2   Situation 2

$$Y = \beta_0 + \beta_1 X_i + \epsilon_i$$

$$= 1 + 0 + X_i - 1 \tag{2}$$

$$= X_i$$

So what we get is:

What we **should** get is:

2.3   Conclusion

- The second PRF is the same as the first, even though – according to the betas – it should be a flat line
- This is only possible, because the error term is not zero and has an interdependence with X_i.