# Friedman's thermostat

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Milton Friedman points out the challenge of studying the impact of monetary policy on the economy with the following analogue: Consider a thermostat, which is programmed to keep the indoor temperature constant. When it gets cold outside, the thermostat works harder. On the contrary, at warmer weathers there is a lower reading on the thermostat. Without taking the outside temperature into account, it would seem as if the thermostat didn't have any impact on the indoor temperature: Regardless of whether the reading is high or low, it always feels the same inside. Technically, regressing $\textit{Indoor temp} = \beta\ \textit{Thermostat} + \varepsilon$ yields $\beta = 0$.

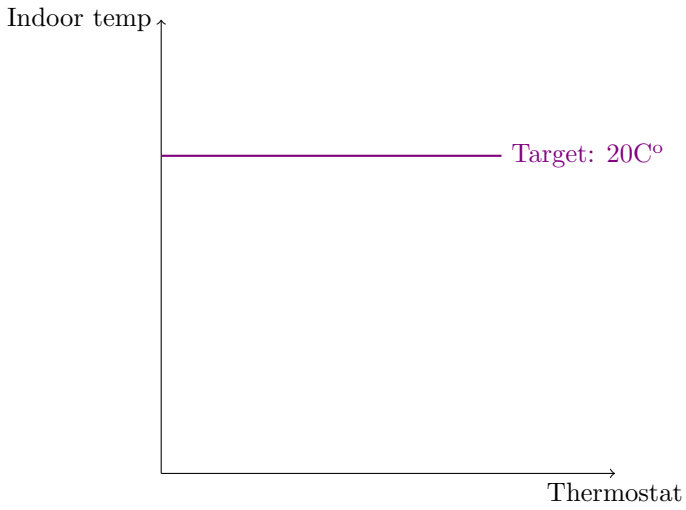


Figure 1: Importantly, even if the violet line was non-horizontal, the regression above would only measure the accuracy of the thermostat in countering changes in the outdoor temperature, not its impact on the indoor temperature.

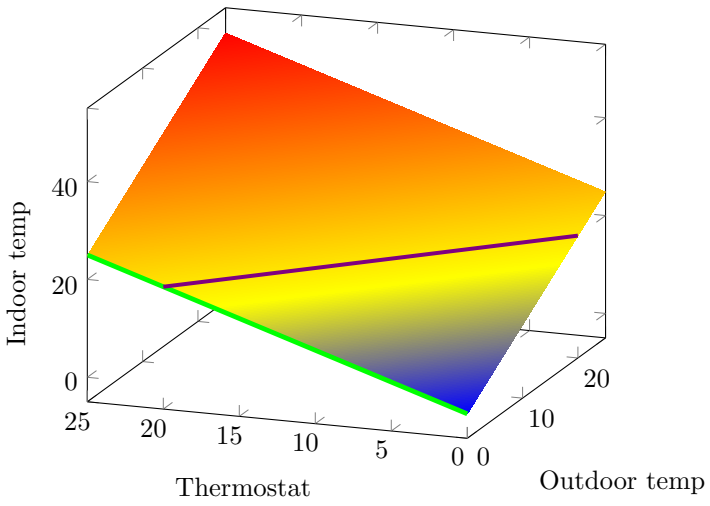


Figure 2: The violet line is the policy curve for the thermostat. The regression fails, because that's the wrong curve to study. The green curve describes the impact of the thermostat on indoor temperature, but it can only be observed if 1) the thermostat functions randomly, or 2) if we can change the rule of how the thermostat reacts to outdoor temperature, and then observe the new violet lines. Also, a freezing cold weather, where the thermostat is not enough to keep the indoor temperature at the target (zero lower bound), is evidence for $\beta \neq 0$.