

105. **Epidemiology – 1** (p.364). Consider a disease (or a signal or a material object) that can be transmitted from position 1 to position 2 with probability  $p$ . This probability is uncertain. Its estimated value is  $\tilde{p}$  with estimated error of  $\pm w$  or more (subject to  $p$  being between 0 and 1). We require that the probability of infection at position 2 not exceed the critical value  $p_c$ .
- (a) Derive an explicit algebraic expression for the robustness function.
  - (b) Two different interventions are available for reducing the transmission probability, where intervention 1 is newer but less familiar and more uncertain than intervention 2. The  $i$ th intervention has estimated transmission probability  $\tilde{p}_i$  and error  $w_i$  for  $i = 1, 2$ , where:

$$\tilde{p}_1 < \tilde{p}_2 \tag{554}$$

$$w_1 > w_2 \tag{555}$$

Identify values of  $p_c$  for which intervention 1 is preferred over intervention 2, based on the robustness function from part 105a. Discuss the concept of an innovation dilemma.