In *Why Look Under the Hood?*, philosopher Daniel Hausman rejects Milton Friedman's argument that an economic theory is valid if it can predict the phenomena it is designed to explain regardless of whether its assumptions are realistic. In this essay Hausman reconstructs Friedman's argument and then attempts to invalidate it through a counterexample.

Friedman's argument (as constructed by Hausman)

(P1) A good hypothesis provides valid predictions concerning the class of phenomena it is intended to explain.
(C1) The only test of whether a hypothesis is good is whether it provides valid predictions concerning the class of phenomena it is intended to explain.
(C2) Therefore, the realism of a theory's assumptions are irrelevant so long as it provides accurate predictions.

To invalidate Friedman's argument, Hausman uses a contradictory analogy: The Road Test. If we imagine the purpose of a theory related to used cars as to predict whether a used car is a good one, then, under Friedman's logic, the only good theory or "test" would be one that shows a used car meets the criterion for a good car (drives safely, comfortably, and economically). Accordingly, Friedman's argument would hold that the only useful test for a car is a road test, which, on any particular occasion, can infallibly show whether a used car can meet the "good car" driving criterion. However, Friedman's argument forces us to dismiss certain details about a car, including its history and the state of its individual components that are very relevant for gauging a car's future performance. In fact, by only assessing used cars by their current performance, this theory would have no predictive power whatsoever. Thus, in scientific theories, it is necessary to align the phenomena that a theory endeavors to predict (e.g, determine if a used car is good) with the actual, realistic factors that cause the phenomena (e.g, its condition under the hood).

It is my view that Hausman unjustifiably invalidates Friedman's argument by not including a temporal criteria in his assessment of a good car. If a good car is defined based on its current and future performance, then the latter must be included in the criterion for a good car. For example, if Hausman had included that a good car does x, y, z *and must do so in the future*, then, as Friedman's argument holds, the only good test would be one that shows a used car meets the xyz criterion *and can do so in the future.* For such a function, Friedman would certainly agree that the road test is not an adequate tool, and one with propositions related to, or reflective of the history of a car and its internal components would be needed to calibrate this test.

One may argue that since Friedman evaluates theories based on valid "predictions" that any temporal qualifier is unnecessary as it is already baked into the function of a theory. Thus, Hausman need not specify that a good car must perform well in the future. For one thing, I

disagree that "predict" has a temporal qualifier in this context. By predict, Friedman only means that a theory must give empirically accurate "outputs," or conclusions about phenomena not yet observed. However, even if we assume "predict" implies the future, we would run into the same problem; using the road test to gauge the future performance of a car violates Friedman's instrumentalism by using a theory to predict a phenomenon outside of its functional domain.

In conclusion, I think Hausman goes awry by trying to show the invalidity of an argument that is actually valid. The aforementioned reconstruction of Friedman's argument can be further simplified into (P1) The role of y is to do x, therefore (C2) the only way to assess y is to assess its ability to do x: an objectively valid argument. While I agree with Hausman's later arguments regarding the importance of realistic assumptions to guide scientific progress and build new theories, these arguments are separate from Hausman's road test analogy and may revolve around scientific practice, not theory.

In *Testability and Approximation*, economist Herbert Simon takes an unconventional approach to refuting Milton Friedman's "principle of reality," the notion that a theory is valid if (some of) its conclusions are empirically true regardless of whether its assumptions are realistic. While many critics of Friedman argue that the reality of assumptions are important to the empirical validity of a theory's conclusions, Simon argues that a theory's conclusions are often empirically untestable, and therefore must be proved valid through empirically valid assumptions.

P1: Macro theories are derived from micro assumptions.
P2: For a theory's conclusions to be valid, they must follow from empirically valid assumptions.
P3: The realism of a theory's assumptions are pertinent to their empirical validity.
C: The realism of a theory's assumptions are pertinent to a theory's validity.

P1: In premise one, Simon argues that theories about higher-level phenomena must follow from lower-level assumptions. As he explains, this logical construction of theories is not merely discretionary, but is required by our notion of explanation as well as required to construct additional theories that build off each other. This, of course, is applicable to economic theories too. We derive the market-sweeping conclusions of macroeconomic theories from microeconomic assumptions, or information about individual economic actors.
P2: The crux of Simon's argument is found in his second premise, where he asserts that, contrary to Friedman's beliefs, the empirically testable propositions of a theory are its assumptions, not conclusions. Accordingly, a theory's conclusions must be derived and grounded in empirically testable propositions. To bolster this argument, Simon analyzes the classical theory of profit maximization. Simplifying a bit, Simon explains that the conclusion of this theory, "firms choose prices/quantities to maximize profits," is based on the assumptions that "businessmen desire to maximize profits" and "businessmen make the calculations that identify the profit-maximizing course of action." However, while it would be impossible to test whether or not on a

macroeconomic basis firms maximize profits (if profit optimality could be empirically grasped, it would be replicated everywhere), the desires and capabilities of individual actors are observable. Furthermore, by all accounts, the assumptions of this theory are patently false. By having a conclusion that is empirically untestable, and assumptions not based in reality, this theory is unfounded. Accordingly, Simon argues, we need empirically valid assumptions to derive macroeconomic, empirically untestable conclusions.

P3: On its face, this premise is relatively uncontroversial. We can only empirically test what we observe in our reality. While the exact threshold for an assumption's "approximate" reality is perhaps ambiguous, there is a clear distinction between an assumption that has no grounding whatsoever in reality and one that endeavors to to approximate reality.

While I do not think Simon's argument is necessarily invalid, I find it rather unconvincing. For one thing, Simon's argument appears to not be a critique of Friedman's methodology, but of one particular example. Certainly there are cases in science where the conclusions of theories *are empirically testable*. For example, in cases of agricultural science that have empirically verifiable theories would Simon hold that the realism of assumptions do not in fact matter? Furthermore, if the conclusions of macroeconomic theories are untestable, it does not appear to me that their underlying assumptions would be any more so. What sort of better "approximate assumptions" could fully capture the diversity and complexity of economic agents? Simon conveniently avoids answering this. Just as macroeconomic conclusions are derived from lower-level, microeconomic assumptions, these assumptions must be then derived from even more fundamental assumptions regarding psychology and perhaps neuroscience: an infinite regress could ensue. In essence, despite describing his rebuttal as "less abstract" than previous critiques of Friedman, I think his argument is quite hypothetical and is in need of concrete suggestions.