

Economics of Biotech and Medical Innovations
Test TWO - Details
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A. Test TWO logistics

1. Test TWO will be on Thursday, November 14 during regular class hours, 4-5:50PM.
2. There will be no extra time. All tests will have to be turned in by 5:50.
3. The test will have about 4 questions, with sub-parts.
4. You can use a calculator.
5. For test 1, several students drew diagrams that were incomplete, not properly labeled, and very difficult to understand. Please make sure all diagrams are drawn properly and complete.
6. Please note that there is no extra credit for writing long answers. My questions will be precise, and your answer should also be precise. I will repeat this message on the test itself.

B. Test TWO materials

1. As noted in the syllabus, all tests contain cumulative materials.

2. Test ONE related materials

- (a) All test one related materials are relevant.
- (b) See review questions for test one - this was posted before test one.
- (c) See test one questions and test one answer guide (was posted on LMS).
- (d) Monopoly. You should be able to solve monopoly numerical problems like in test one, as well as all related diagrams. See test one and review previous materials for this.
- (e) Bertrand. You should be able to draw diagrams and analyze demand and cost issues. Review previous materials for this. There will be **NO** numerical/mathematical problem related to Bertrand.
- (f) You should be able to draw equilibrium diagrams related to (i) monopoly, (ii) monopsony, (iii) bilateral-monopoly and (iv) Bertrand. We covered these extensively for test one. Please review all test one materials.

2. New Materials: Hepatitis-C

** We covered extensive details in class, the readings posted on LMS, and class whiteboard discussions. The list below will help you recap the main items. Each item can also be thought of as potential question(s).*

We completed the Hep-C module. For test two, all Hep-C materials are relevant. Some helpful details on the Hep-C module are noted below.

In class we discussed the broad picture related to Hep-C, emergence of various innovations in treatment, Pharmasset, Gilead Sciences, pricing, emergence of competitors, stock market equilibrium and effects, what determines stock price movements, benefits and costs, healthcare costs for patients and the system, insurance coverage, and related issues. All readings for the

Hep-C module are posted on LMS. We discussed them in class. We also covered a fair amount of materials on the whiteboard and class discussions.

Below is both a reading guide and potential questions (i.e., each item could be framed as a question). This is not an exhaustive list but covers some of the main items.

1. Hep C and discovery. What are the typical causes. Time path of increase in viral load in patients. Brief details.
2. Nature of the “traditional” treatments for Hep C. Details on:
 - (i) Timeline of cure/treatment. Are these short-term or long-term.
 - (ii) Which firms/drugs provided the mainstay of treatments.
 - (iii) Approximate treatment costs, and whether these are short-term or long-term.
3. Characteristics that defined Sovaldi as the defining drug in this area of therapy. Details on:
 - (i) Nature of innovation. Information/data showing the significance of the specific innovation.
 - (ii) Timeline of cure/treatment. Are these short-term or long-term.
 - (iii) Approximate treatment costs, and whether these are short-term or long-term.
4. Brief history of Pharmasset (just the main points in path to innovation are sufficient).
5. Acquisition of Pharmasset by Gilead. Acquisition cost. Risk-reward tradeoff. Significance of this for Gilead’s future strategy.
6. Gilead’s costs to bring Sovaldi to market.
7. Harvoni, an improvement over Sovaldi. Initial treatment price in the US for Sovaldi and Harvoni. Timeline of treatment.
8. Adoption rates of Sovaldi and Harvoni.
9. Revenue generated by Gilead from Hep-C treatments, Sovaldi and Harvoni.
10. Initial projections about the total number of patients with Hep C in the US. Potential changes in projections over time.
11. Briefly describe, with examples and numbers, the magnitude of the cost problems faced by the US healthcare system by Sovaldi and Harvoni in the first 1-3 years of their introduction.
12. Sovaldi/Harvoni, monopoly period, entry by competitors (names of main competitors, firms, the prices they set), product prices, and stock market response.
13. FDA approvals of Gilead meds as well as main competitors. Name of drug (firm), approximate date of approval.

14. Did the initial cost problems created by Sovaldi and Harvoni for the US healthcare system change over subsequent years? If yes, what were the main reasons. Provide details, illustrative numbers, and timeline.

15. All information considered, how would you assess the short-term and long-term costs and benefits of Sovaldi/Harvoni? Provide approximate numbers.

16. Cross-country differences in treatment costs of Sovaldi. Equilibrium models that explain the differences.

17. Potential lessons for US healthcare policy and insurance from the Hep-C example.

19. As we have consistently discussed in class, be aware of the key data related to this module. Costs, demand, patient pool, revenues, Gilead and competitor prices, insurance, overall costs to healthcare system, among others.

20. As we did in class repeatedly, look through the various readings for the important tables and figures. You should be aware of these items and know how they fit into different aspects of the Hep-C module.