



Open Question 1. Mortgage Securitization: Innovation or Instability?

Securitization is the process of converting various types of assets into tradable securities. The most common method involves pooling large assets together and issuing a larger number of small securities linked to this pool.

Financial innovation, and particularly securitization, are often cited as key drivers behind the U.S. housing boom of the early 2000s and the subsequent financial crisis. By the end of 2022, the U.S. securitization market exceeded \$12.5 trillion, which is about half of the U.S. GDP.

In this question, you'll explore the advantages and disadvantages of securitization and its impact on the housing and mortgage markets. Consider a simple example. A bank issues 100 mortgage loans, each worth \$1 million. The bank then creates 10,000 securities, each promising investors a 1/10,000th share of the total payments from the pool.

(a) (9 rp) A bank wants to sell all 100 mortgage loans to investors.

There are two ways to do this:

1. Each loan is individually auctioned to the highest bidder.
2. The loans are pooled together, and securities are issued as described above, then auctioned.

Which method is more profitable, and why? Provide three reasons.

(b) (5 rp) Explain how securitization can lead to house price appreciation.

(c) (8 rp) Provide two reasons why securitization may cause more risks for investors.

(d) (8 rp) Credit Score is the most common indicator of a borrower's creditworthiness, calculated using the borrower's credit history (i.e., how the borrower was making loan payments in the past). To improve housing affordability, the government considers offering subsidized mortgage insurance on mortgages with low risk of default, that is, with the borrower's credit score of 620 and above. Surprisingly, in the years after the policy was implemented, mortgages with a credit score of 620 defaulted more frequently than those with a credit score of 619. Why did this happen?

Open Question 2. Water Restrictions

Residents of Catalonia (autonomous community of Spain) during the winter of 2023-24 faced water usage restrictions due to drought. Fountains were turned off, watering lawns, filling pools, washing streets and house facades were prohibited; restrictions also affected public showers and car washes. When the author of this task asked GPT-4 how the introduction of such restrictions could affect the price of water, he received the following response:

The reduction in water availability can lead to an increase in its cost to cover expenses for extraction, purification, and distribution. When water becomes a scarce resource, its extraction and delivery to consumers require additional costs, for example, through the use of alternative water sources or enhanced purification.

Indeed, economics textbooks typically state that a quota (limitation of the quantity of a good) leads to price increases. However, the goal of the restrictions imposed by the government of Catalonia is, on the contrary, to prevent excessive price increases for households — water consumers.

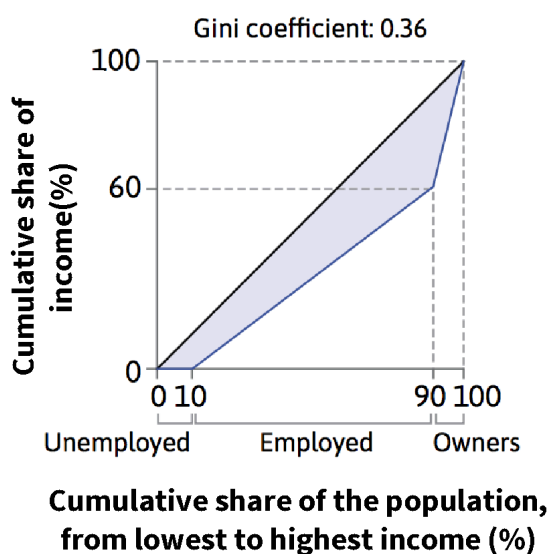
- (a) (12 rp) Construct an economic model of the perfectly competitive market with two groups of consumers (car washes and households), which demonstrates that restricting water consumption for one group of consumers (car washes) can lead to a decrease in price compared to equilibrium without intervention. Provide the analytical or graphical solution of your model. Assume that the quota for car washes is below their level of water consumption at equilibrium but above zero, and that car washes can trade quotas, meaning the most economically efficient among them will buy water.
- (b) (9 rp) How does such government intervention in your model affect the surpluses of each group of consumers and producers, as well as the overall social surplus (welfare)? Provide calculations or show graphically. Can one specify functions and parameters of the model so that the impact on the social surplus is reversed?
- (c) (9 rp) Suppose the government can regulate the price of water for car washes, and resale of water between consumer groups is impossible. Instead of setting a quota for car washes, the government increases the price for them to reduce their consumption to the level of the previous quota. The price for households is set at the equilibrium level. Analyze this approach compared to the quota in terms of the surplus of each group of consumers and producers.

Open Question 3. Lockdown and Inequality

During the first UK national lockdown in 2020, the government announced a furlough scheme for all full-time workers. Under this scheme, firms could apply for government support to pay up to 80% of the wages of workers who were unable to work (for example, because the firm was required to close during the lockdown).

- (a) (6 rp) Use the concept of 'firm-specific assets' to explain why firms may prefer to furlough their workers during a temporary dip in demand (like the UK national lockdowns) rather than fire their workers or make them redundant. Give an example to support your explanation.

Other countries also implemented similar schemes during 2020. The diagram below shows the distribution of income before the COVID-19 pandemic, for a hypothetical country that consists of unemployed workers, employed workers, and owners (of capital). Each employed worker earns the same wage, and there are no unemployment benefits.



Suppose that this country implemented a furlough scheme during the COVID-19 pandemic (Scenario A). When the scheme was in effect, unemployment increased by 2 percentage points and the cumulative share of income for employed workers fell to 54%. Assume that all workers who remained employed were furloughed. Suppose that if the government had not implemented the furlough scheme, the unemployment rate would have increased by 10 percentage points and the cumulative share of income for employed workers would have been 48% (Scenario B).

- (b) (16 rp) Describe how Scenario A and Scenario B change the shape of the Lorenz curve. By calculating the Gini coefficient in Scenario A and Scenario B (or otherwise), discuss the effect of the furlough scheme on income inequality.
- (c) (8 rp) Suppose that during the pandemic, some of the unemployed workers joined the gig economy, where they could make some income but with a lower hourly wage than from formal employment. Analyze the potential effects of these gig economy workers on income inequality. State any assumptions you make.

Open Question 4. Competition with the Leader

In country B, the market for beer is organized as follows: There is a major brewery, Brewery A, and numerous (potentially very many) microbreweries and craft beer producers. Brewery A is the market leader and sets the price for a bottle that others follow as price-takers. After Brewery A sets the price, each price-taking firm decides how much beer to produce (if any). Any demand not met by these firms is satisfied by Brewery A.

Assume the market parameters are as follows:

- beer is a homogenous product, but the production technologies may differ across firms;
- the demand function is $D(p) = 20,000 - 3p$;
- the marginal cost of Brewery A is constant and equal to $MC_A = 30$;
- marginal cost of price-taking firm number i is $MC_i = 3i + q_i$, where $i = 1, 2, 3, \dots$, and q_i is the amount of beer produced by firm i .

Also, just in case you forgot, $1 + 2 + 3 + \dots + n = n(n+1)/2$.

- (a) (5 rp) Determine the supply function of a price-taking firm i . Don't forget to specify the supply level under **all** prices.
- (b) (5 rp) How many price-taking firms will produce beer under different prices set by Brewery A?
- (c) (10 rp) What is the profit-maximizing price that firm A should set?
- (d) (5 rp) You are the economic advisor to the President of Country B. The President believes that to improve consumers' welfare, the government needs to cease operations of Brewery A because it has enormous power in setting prices, which is always bad for consumers. If this policy is implemented, the market becomes perfectly competitive with only price-taking firms ($i = 1, 2, 3, \dots$). What advice would you give regarding such a policy?
- (e) (5 rp) Now assume that instead of shutting down Brewery A, the government orders it to become one of the price-taking firms. That is, the market becomes perfectly competitive with Brewery A and some other firms ($i = 1, 2, 3, \dots$). How many firms will there be in the market in equilibrium? Compare this situation with (c) from the perspective of: (1) market concentration, (2) consumers' welfare.

Open Question 5. Sharing the Lake

Lake L is situated near a village. In this task, we will consider different property rights regimes for the lake and explore their implications on the villagers' well-being and the environment.

Assume that the production function of the lake is $f(x) = 100\sqrt{x}$, where f is the total amount of fish (in kilograms) that can be caught in the lake per day, and x is the number of fishing nets used. A kilogram of fish can be sold in the market for \$10, and the daily rental price for a fishing net is \$25.

- (a) (7 points) Suppose Firm A owns the lake and has exclusive fishing rights. It does not have any cost besides fishing nets rental. Calculate the amount of fish that it will catch to maximize profits.
- (b) (6 points) Now, suppose Firm A makes money by charging villagers a per-net fee to fish in the lake, rather than selling the fish directly. Assume that all fishermen fish with the same intensity, collectively catching the maximum possible fish with the given number of nets and selling it in the market. In addition to the per-net fee charged by Firm A, each fisherman must pay \$25 per day to rent a net. What will the per-net fee be?
- (c) (7 points) The government decides to nationalize the lake, making it open-access for the villagers. Now, every villager can fish using one or more nets, which still need to be rented for \$25 each. Assuming each villager only considers their own benefit, determine the number of nets that will be used and the total amount of fish that will be caught. Compare your answer to parts (a) and (b) and explain the differences.
- (d) (4 points) What are the likely long-term consequences for the fish population in the lake? What is the economic term for the problem that arises in this situation?
- (e) (6 points) If you have solved the previous parts correctly, you will find that the economic position of the villagers (the fishermen) is unfavorable under both private and public ownership of the lake. However, there is hope. Elinor Ostrom's research highlights that community members can successfully manage common-pool resources through cooperation and the establishment of social norms, even with limited or no official government regulation. Suggest two principles for designing these norms and institutions to enhance their effectiveness. Explain the importance of each principle in ensuring the sustainable and efficient use of common-pool resources. You can either rely on Ostrom's research or suggest your own principles.