I. Business Context & Objectives

Business Context:
Melbourne residential property transactions dataset with fields: `Date, Regionname, Suburb, Price, Rooms, Bathroom, Car, Landsize, BuildingArea, YearBuilt, Type, Method, SellerG`.

Objectives:
Leverage historical transactions and property attributes to support key decisions in **pricing**, **site selection**, **listing strategy** (e.g., auction vs. private sale), **inventory (product) mix optimization**, and **risk monitoring**.

II. Stakeholders

- **Buyers:** Identify areas/suburbs with strong value-for-money and growth potential.
- **Agencies:** Set listing prices, choose sale method (**Method**), and plan product mix and release cadence.

III. Use Case

We organize use cases along two complementary lenses:

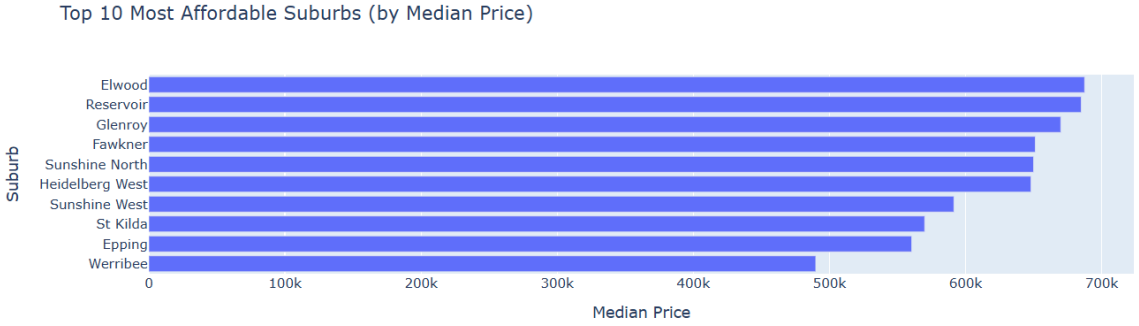
- **Branch A – Price ↔ Features:** How each attribute associates with *Price*.
- **Branch B – Market ↔ Features:** How attributes and price structure vary across markets (*Regionname/Suburb/Method*), enabling targeting and portfolio planning.

For each UC below, we list **Question → Analytical Approach → Key Metrics → Actionable Output**.

Branch A — Price ↔ Features

UC1.a — *Suburb* vs *Price*

Question: Which suburbs are most/least expensive?
Approach: Median and IQR of **Price** by **Suburb**, highlight Top-10 high and Top-10 affordable (with counts).
Key Metrics: Median, IQR, count; affordability buckets.
Output: Ranked lists; affordability map/list for buyer targeting.

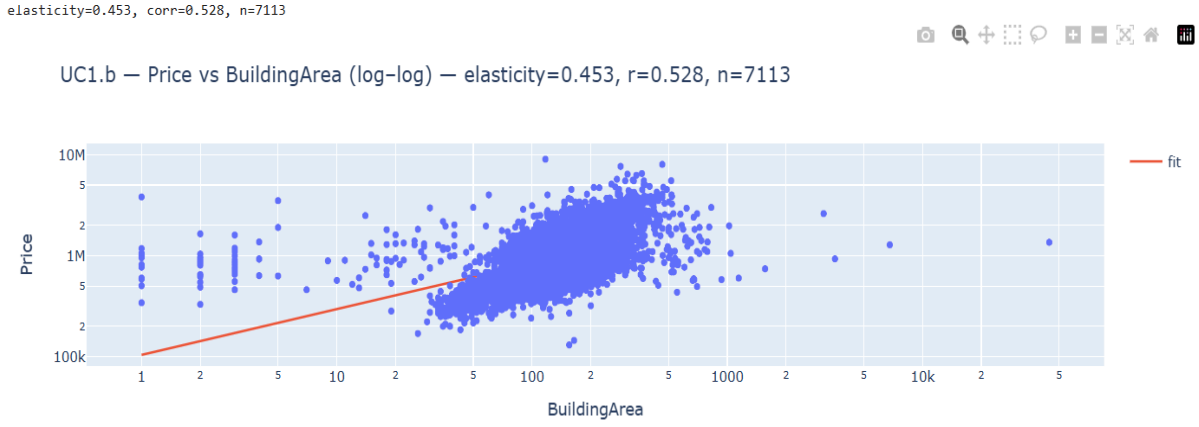


Answer:The market splits clearly: The priciest suburbs cluster around **A$1.6M–1.9M** median—for example **Albert Park ≈ A$1.90M (n=69)**, **Canterbury ≈ A$1.89M (n=54)**, **Balwyn ≈ A$1.85M (n=107)**, and **Brighton ≈ A$1.78M (n=186)**. By contrast, the most affordable suburbs sit around **A$0.50M–0.70M**, e.g., **Werribee ≈ A$0.50M**, **Epping ≈ A$0.55M**, **St Kilda ≈ A$0.57M**, and **Reservoir/Elwood ≈ A$0.68–0.70M**.

High-end areas exhibit wider price spreads, indicating mixed product types and micro-location effects—for instance **Camberwell IQR ≈ A$1.48M** and **Brighton IQR ≈ A$1.26M**.

UC1.b — *BuildingArea* ↔ *Price*

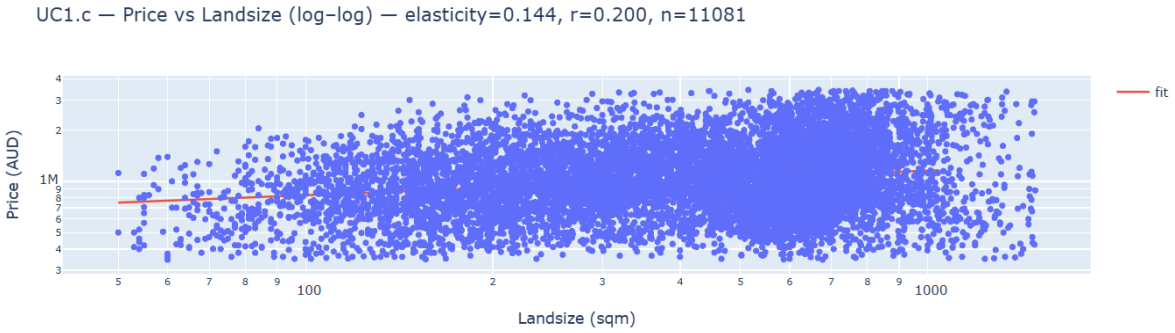
Question: How strongly does floor area drive price?



Answer:**Floor area vs price:** Under the business filter (30–800 sqm), floor area shows a strong positive association with price: **elasticity ≈ 0.69, r ≈ 0.64 (n=6,870)**. Interpreting the slope: **+10% floor area → ~+6.9% price** on average. Treat the fitted line as an **overall trend**, not an individual appraisal. For houses/townhouses only, elasticity is **~0.54 (n≈5,368)**.

UC1.c — *Landsize* ↔ *Price*

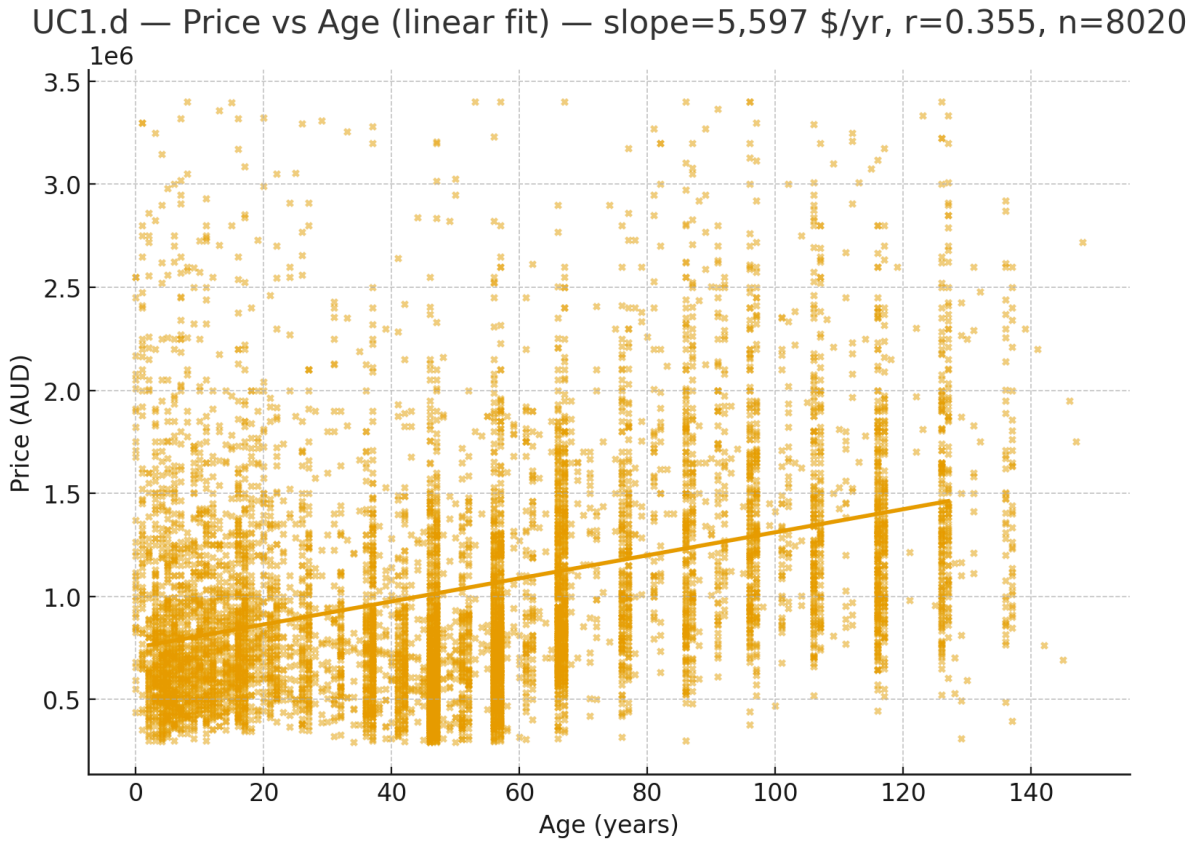
Question: Do larger lots command higher prices?



Answer:Plot shows a **weak positive** association with price. On a log–log scale, the **elasticity is ~0.144** and the correlation is **r ≈ 0.200** (n = **11,081**). Interpreting the slope: **every +10% increase in land size is associated with only ~+1.4% higher price on average**. This is **much weaker** than the floor-area effect, suggesting that land's contribution is heavily mediated by **location, buildarea, and product type**.

UC1.d— *Age* (from *YearBuilt*) ↔ *Price*

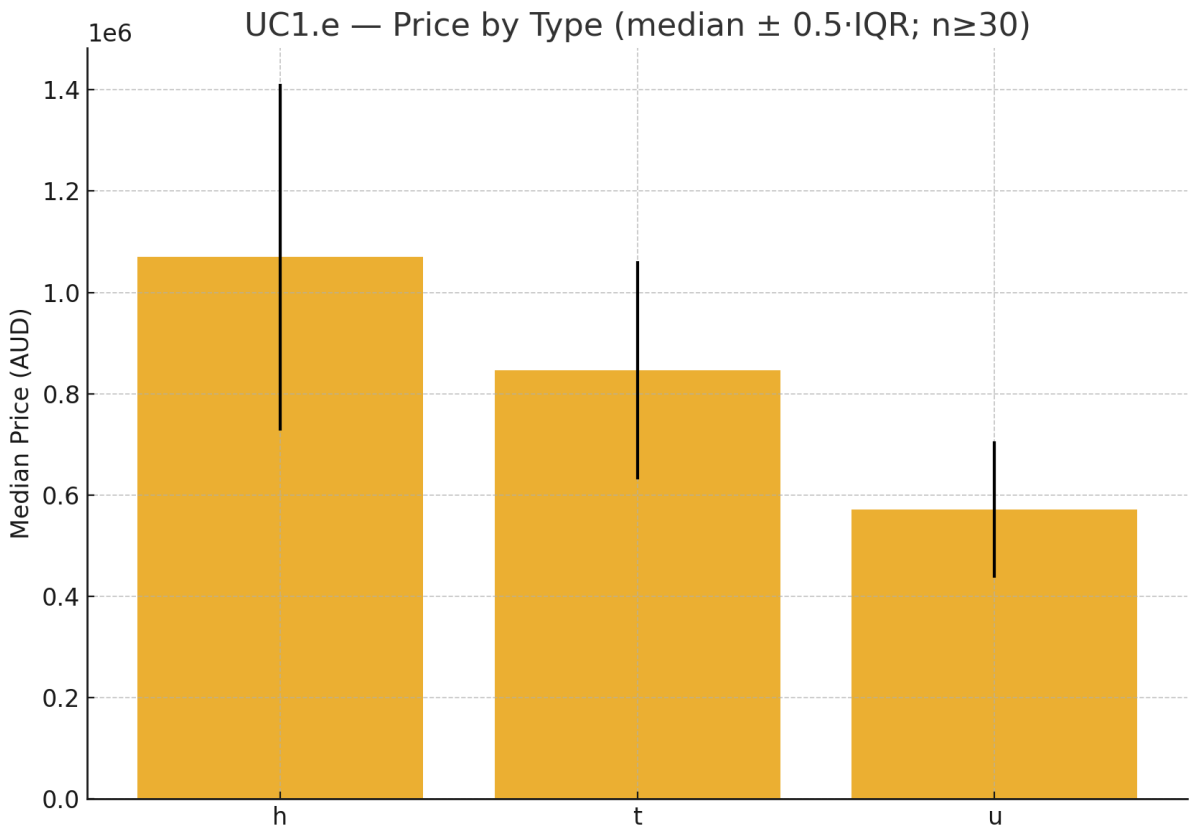
Question: Do newer homes price higher?



Answer:The age of a property and its price exhibit a moderate positive correlation: correlation coefficient r=0.355, sample size n=8,020. The linear regression slope is approximately A$5,597 per year, meaning that for every additional year of age, the price increases by about A$5.6k on average. This contradicts the common intuition that older properties are cheaper. This discrepancy is likely due to the influence of location and property type: older properties in the core of Melbourne tend to be more expensive overall, thus skewing the overall correlation between property age and price.

UC1.e — *Type* ↔ *Price*

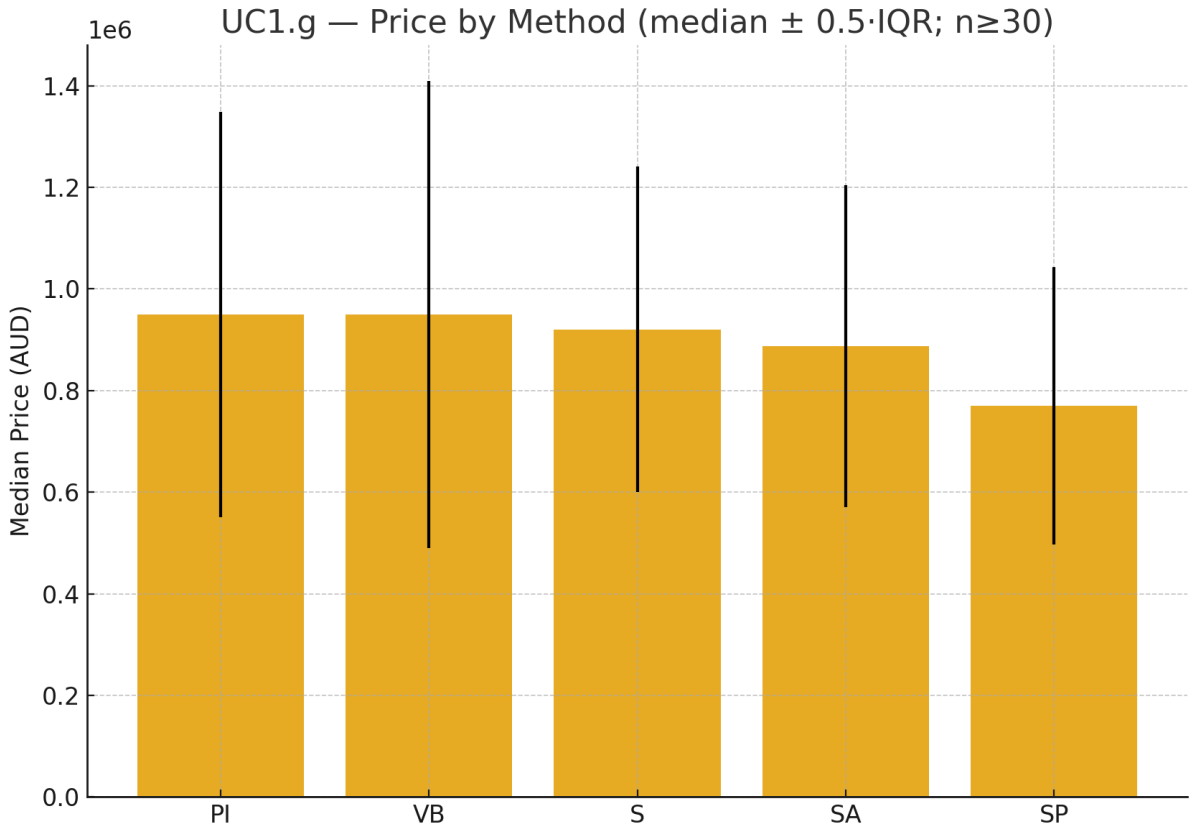
Question: Do housing types differ materially in price?



Answer: The price of different property types shows a clear gradient: detached houses (h) are the most expensive, with a median price of approximately A$1.05M; townhouses (t) are in the middle, at around A$0.84M; and apartments (u) are the cheapest, at approximately A$0.57M. Furthermore, the interquartile range (IQR) for detached houses and townhouses is larger, indicating that location and size have a greater impact on price, leading to more variation within the same property type. The IQR for apartments is smaller, suggesting a more concentrated price range. In practice, when setting prices and listing properties, the property type should be the primary factor determining the base price, with factors such as size and condition added as secondary considerations. In terms of product mix, focusing on apartments in the inner city and detached houses/townhouses in the suburbs better reflects market demand.

UC1.g — *Method* ↔ *Price*

Question: Do auctions sell higher than private sales?



Answer: The median price for properties sold via auction (S=Sold at auction, SA=Sold after auction) is generally slightly higher than or similar to that of properties sold through other methods (e.g., SP=Sold prior, PI=Passed in, VB=Vendor bid); however, the interquartile range (IQR) for each method is large, and the distributions overlap significantly, indicating that factors such as location, property type, and listing time also play a role.

Branch B — Market ↔ Features

UC1.a — *Date* (seasonality) ↔ *Market*

Question: Are there seasonal or cyclical effects on price?

UC2.b — Market structure by *Suburb*

Question: Which suburbs fit given budget and product constraints?

UC2.c — *Method* mix by market

Question: Where and when are auctions most prevalent/effective?

UC2.d — Affordability & Targeting (price bands)

Question: How to segment markets by affordability?

UC2.e — Product-mix suitability by market

Question: Where do larger floor areas, more bathrooms, or more car spaces sell best?

UC2.f — Risk monitoring (within available fields)

Question: Are there abnormal shifts that warrant attention?
