

# Zillow Offers / iBuying: When the Forecast Breaks

## AI Forecast Model Risk Translating into Real-World Losses

Case Packet (Student Handout)

Course: AI in Business

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### Teaching-use only

- **No proprietary data required.** Exhibits are assembled from public sources (EDGAR filings, investor materials, and a third-party transcript).
- **LLM use is integral to the learning goals** and will be assessed via (i) evidence discipline and (ii) reproducibility (prompt audit trail).
- **Golden rule: LLMs are not data sources.** All numbers must be taken from exhibits and/or computed in your spreadsheet.

# 1 Student Handout

## 1.1 Case Overview

Zillow Group built one of the most widely recognized consumer data assets in U.S. housing and popularized algorithmic home valuation via the *Zestimate*.<sup>1</sup> In 2018, Zillow entered iBuying through *Zillow Offers*: the company would purchase homes directly, renovate, and resell them. Conceptually, iBuying is an inventory business that depends on:

- pricing homes at acquisition and forecasting future selling prices,
- managing renovation and time-to-sale (holding period),
- controlling operational execution and financing/liquidity.

In late 2021, Zillow announced that it would wind down Zillow Offers, citing that the *unpredictability in forecasting home prices* exceeded what the firm had anticipated and created unacceptable earnings and balance-sheet volatility (**Exhibit 2**). The wind-down followed operational capacity constraints (**Exhibit 1**) and coincided with significant inventory write-downs and segment losses reflected in financial statements (**Exhibit 2**, **Exhibit 4**, **Exhibit 5**).

## 1.2 Your Role and the Decision Context

You are a second-year associate on the research team at **North Bridge Capital**, a Boston-based public-equity investment firm. Your portfolio manager is preparing for tomorrow morning’s investment committee. She wants a sharper answer to a durable question:

### Decision prompt

**How should an analyst evaluate an AI-enabled forecasting system when the model is embedded in a capital-intensive inventory business?**

- Was Zillow Offers mainly a temporary execution failure, or did it reveal a deeper limitation of AI/forecasting models in real business settings?
- What did the forecasting system actually do, what economic exposure did it create, and how did the resulting errors show up in the financial statements?
- How do forecasting error, selection, and execution constraints become real financial losses at scale?

You will answer these questions using the provided exhibits, your spreadsheet, and a disciplined LLM workflow. A comprehensive analysis of these issues requires processing a large volume of material across the exhibit set and would typically take an analyst a long time to complete. With

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<sup>1</sup>Before you start this case, read “[The Future of Housing Rises in Phoenix: High-tech flippers such as Zillow are using algorithms to reshape the housing market](#)” (*The Wall Street Journal*, June 19, 2019). The article helps you appreciate the original business logic and excitement behind iBuying—why Phoenix became a proving ground, why scale and convenience seemed so powerful, and why low margins made forecasting and execution so critical. It is also provided separately as a PDF in the course materials.

smart, disciplined use of an LLM as a co-pilot, however, you should be able to produce a sophisticated, fully evidence-based memo within about five hours.

### 1.3 Learning Goals

#### The Core of the Case

This case is a live investing question about what happens when a predictive system is connected to:

- **inventory:** the company buys real homes,
- **time:** the economics depend on future resale outcomes, not just today's estimate,
- **operations:** renovations, contractors, and cycle time matter,
- **capital:** errors can become write-downs, margin collapse, and financing stress.

By completing this case, you will be able to:

- translate an AI/forecasting model into an **economic exposure map** (what the model is used for, what positions it creates, and where mistakes show up),
- connect model risk to **earnings quality** (inventory write-downs, margins, working capital, and balance-sheet strain),
- evaluate the **limitations of machine learning and forecasting models** once they are deployed in noisy, changing, strategic business environments,

### 1.4 What You Are Given

#### Provided materials

- A pre-assembled exhibit binder (**Exhibit 1–Exhibit 7**) and line-numbered text extracts for citation.
- A blank spreadsheet template with four tabs: **Timeline**, **Fact Bank**, **Exposure**, and **Earnings Bridge**.
- Required appendix templates for an **Evidence Table** and an **LLM Audit Trail**.

### 1.5 Case Tasks and Questions

#### Q1 — Build the high-signal timeline (LLM-assisted, human-verified)

Use the **Timeline** tab in the spreadsheet.

Using Exhibits 1, 2, 3, 6, and 7, build a **5–8 row timeline** covering the period from **October 18, 2021 to February 10, 2022**. For each row, include:

- date,
- event,
- why the event matters analytically,

- one exact quote or one exact number,
- primary citation (**Exhibit #** page or line range).

A strong timeline should allow a reader to quickly see the arc of the case: how operational strain emerged, how the company reassessed the economics of Zillow Offers, how the financial consequences became visible, and how management discussed funding, liquidity, and the progress of the wind-down. In other words, your timeline should not be a random list of dates. It should highlight the few events that best explain how an AI-enabled forecasting business scaled into a real operating and financial problem.

## Q2 — Spreadsheet A: quantify exposure and financing risk

Use the **Exposure** tab in the spreadsheet.

Using **Exhibit 4**, build a small exposure table and compute the following four metrics:

1. **Homes under contract / inventory**
2. **Borrowings / inventory**
3. **Borrowings / total maximum borrowing capacity**
4. **Committed exposure / total maximum borrowing capacity**, where committed exposure is defined as:

$$\text{Committed exposure} = \text{Inventory} + \text{Homes under contract not yet closed}$$

Instructions:

- If a requested figure is not explicitly disclosed, enter N/A and write **Not in exhibits** in the notes column.
- Below the table, write a short interpretation (approximately 150–200 words) explaining what the numbers imply about **scale, balance-sheet exposure, and financing risk**.

**Goal:** show how a forecasting model became a capital allocation problem.

## Q3 — Spreadsheet B: build the earnings-quality bridge

Use the **Earnings Bridge** tab in the spreadsheet.

Using **Exhibit 4**, compute and clearly label the following:

1. **Inventory write-down as % of Sept. 30, 2021 inventory**
2. **Inventory write-down as % of Q3 2021 Homes segment revenue**
3. **Inventory write-down relative to Q3 2021 Homes segment profit/loss**

Then write a short note (approximately 200 words) answering both questions:

- Why is this write-down economically important rather than merely an “accounting” issue?
- Why should an analyst be cautious about simply adjusting it away as non-recurring?

**Goal:** translate model failure into financial-statement consequences.

## Q4 — Build the fact bank and use it to analyze forecasting-model risk in a real business setting

Use the **Fact Bank** tab in the spreadsheet.

### Part A: Build the factual information bank.

Extract **12–15 verified factual statements** from Zillow’s disclosures and organize them into four buckets:

1. forecasting model disclosures,
2. scale/exposure,
3. operations/capacity,
4. accounting/financial impact.

As you design your prompt, focus on extracting a mix of:

- management statements about the forecasting challenge Zillow faced,
- facts that show the size and pace of the business as it scaled,
- facts that describe the operating environment in which the model was being used,
- facts showing how the consequences appeared in financial results, the balance sheet, or the wind-down process.

A good fact bank should include both **qualitative disclosures** (what management said) and **quantitative disclosures** (what the numbers show). The goal is to build a set of factual building blocks that you can later use to analyze not just the model itself, but also the business setting in which the model was deployed.

Every later answer in the memo should cite facts from this bank by ID.

### Required format and one example

Write each fact as one sentence with the exact number or wording preserved. Example:

On Nov. 2, 2021, Rich Barton said Zillow had determined that the unpredictability in forecasting home prices exceeded what it anticipated and that continuing to scale Zillow Offers would create too much earnings and balance-sheet volatility (**Exhibit 2**, page\_\_\_).

Then add a short verification note explaining what you checked.

## Prompt scaffold for Q4

You may adapt the wording, but a useful starting prompt would look something like this:

Using only Zillow Exhibits 1–3 and 5–7, extract 12–15 verified factual statements that are most useful for analyzing Zillow Offers as a forecasting-driven business. Organize the facts into four buckets: (1) forecasting model disclosures, (2) scale/exposure, (3) operations/capacity, and (4) accounting/financial impact.

Aim for a mix of management language and concrete numbers. Focus on facts that help explain what Zillow said about the challenge it faced, how large the business became, what operating conditions mattered, and how the consequences appeared in financial results or the wind-down.

For each fact, provide:

- Bucket
- Fact ID
- One-sentence factual statement with exact wording or exact number preserved
- Exhibit citation
- Short verification note

Do not infer missing facts. Do not use outside sources. If an important detail is not explicitly disclosed, write “Not in exhibits.”

### **Part B: Use the fact bank to analyze ML/forecasting risk.**

Using your fact bank, and your answers to previous questions, discuss the risks in machine learning forecasting models and how these risks manifest in a real business setting.

Specifically, your answer should distinguish between:

- **nowcasting** a home’s current value,
- **forecasting** the future resale economics over a holding period.

Then discuss **three drivers** behind how modest forecast errors could become large realized business losses once the model was deployed at scale.

**Deliverable standard:** this should read like a business analysis of model risk, not a generic discussion of machine learning.

### **Q5 — Adverse selection as a hidden forecasting risk in business applications**

Before answering this question, read the following background article:

<https://www.gsb.stanford.edu/insights/flip-flop-why-zillows-algorithmic-home-buying-ventu>

This article is background reading only. It is meant to help you understand the **adverse-selection hypothesis**. Your case-specific support, however, should come from the exhibits and your **Fact Bank**, not from the article itself.

In your memo, answer the following:

1. Briefly explain what the **adverse-selection hypothesis** means in Zillow’s case.
2. Identify **one to two facts** from your fact bank that could be viewed as at least potentially consistent with the adverse-selection hypothesis.
3. Explain what the adverse-selection hypothesis teaches us about applying machine learning models in a **business setting** relative to a **natural science setting** such as predicting weather or protein structure.

## Q6 — Investment committee recommendation

Write a **300–400 word recommendation** to your portfolio manager answering this question:

*Should analysts apply an information-risk discount when thinking about Zillow’s valuation multiple after the Zillow Offers episode?*

Your recommendation must:

- use at least **four exhibit-based facts**,
- use at least **two spreadsheet metrics**,
- state your conclusion clearly,
- end with **two general lessons** about the strengths and limitations of machine learning / forecasting models in real business applications.

## 1.6 Required Deliverables

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Deliverable	Format / length	What it must include
Report	Max 3 pages (appendices excluded)	Clear responses to Q4 (part B)–Q6
Completed spreadsheet	Excel spreadsheet using the provided template	Completed <b>Timeline</b> , <b>Fact Bank</b> , <b>Exposure</b> , and <b>Earnings Bridge</b> tabs with clearly labeled exhibit inputs
LLM audit trail (required)	Appendix	prompts used + selected outputs + verification notes showing what you checked, rejected, or corrected

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## 1.7 Exhibit Table of Contents

You are provided the following exhibits.

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<b>Exhibit</b>	<b>Description</b>	<b>Primary source (URL)</b>
<b>Exhibit 1</b>	Zillow investor press release: operational capacity constraints; paused signing new purchase contracts through end of 2021 (Oct. 18, 2021)	<a href="https://investors.zillowgroup.com/investors/news-and-events/news/news-details/2021/At-Operational-Capacity-Zillow-Offers-to-Fdefault.aspx">https://investors.zillowgroup.com/investors/news-and-events/news/news-details/2021/At-Operational-Capacity-Zillow-Offers-to-Fdefault.aspx</a>
<b>Exhibit 2</b>	Zillow Form 8-K exhibit (EDGAR): Q3 2021 earnings release; wind-down decision; inventory write-down disclosure (Nov. 2, 2021)	<a href="https://www.sec.gov/Archives/edgar/data/1617640/000161764021000085/q32021991.htm">https://www.sec.gov/Archives/edgar/data/1617640/000161764021000085/q32021991.htm</a>
<b>Exhibit 3</b>	Q3 2021 shareholder letter (Nov. 2, 2021)	Q3 2021 shareholder letter
<b>Exhibit 4</b>	Zillow Form 10-Q for quarter ended Sept. 30, 2021 (balance sheet exposure; Homes segment detail; inventory/financing context)	<a href="https://www.sec.gov/Archives/edgar/data/1617640/000161764021000087/z-20210930.htm">https://www.sec.gov/Archives/edgar/data/1617640/000161764021000087/z-20210930.htm</a>
<b>Exhibit 5</b>	Zillow Form 10-K for year ended Dec. 31, 2021 (risk factors; inventory write-down totals; wind-down/discontinued operations discussion)	<a href="https://www.sec.gov/Archives/edgar/data/1617640/000161764022000013/z-20211231.htm">https://www.sec.gov/Archives/edgar/data/1617640/000161764022000013/z-20211231.htm</a>
<b>Exhibit 6</b>	Zillow investor press release: wind-down progress; share repurchase; cash-flow-neutral expectation and secured debt reference (Dec. 2, 2021)	<a href="https://investors.zillowgroup.com/investors/news-and-events/news/news-details/2021/Zillow-Group-Announces-Significant-Progressdefault.aspx">https://investors.zillowgroup.com/investors/news-and-events/news/news-details/2021/Zillow-Group-Announces-Significant-Progressdefault.aspx</a>
<b>Exhibit 7</b>	Q4 2021 shareholder letter (wind-down update; segment performance context) (Feb. 10, 2022)	<a href="https://s24.q4cdn.com/723050407/files/doc_financials/2021/q4/Zillow_4Q-21_Shareholder_Letter.pdf">https://s24.q4cdn.com/723050407/files/doc_financials/2021/q4/Zillow_4Q-21_Shareholder_Letter.pdf</a>

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