Load & Merge

In [7]:

```
import pandas as pd

# 1. Load
a1 = pd.read_csv('annex1.csv')   # Item master (optional)
a2 = pd.read_csv('annex2.csv', parse_dates=['Date'])
a3 = pd.read_csv('annex3.csv', parse_dates=['Date'])
a4 = pd.read_csv('annex4.csv')

# 2. Clean Annex2
a2 = a2.drop_duplicates()                        # drop the 212 dupes
a2['Quantity'] = a2['Quantity Sold (kilo)']
a2['UnitPrice_RMB'] = a2['Unit Selling Price (RMB/kg)']
a2['IsReturn'] = (a2['Sale or Return'] == 'Return')

# 3. Merge in cost data from Annex3
df = a2.merge(a3[['Date','Item Code','Wholesale Price (RMB/kg)']],
              on=['Date','Item Code'], how='left')
```

(Compute fields) Quantity, Sales_INR, Cost_INR, Margin, Return flag

In [8]:

```
# 1. Merge in loss-rate from Annex4
df = df.merge(a4[['Item Code','Loss Rate (%)']], on='Item Code', how='left')

# 2. Compute Sales, Cost, Margin
RMB_to_INR = 12.3  # adjust to current rate
df['Sales_INR'] = df['Quantity'] * df['UnitPrice_RMB'] * RMB_to_INR

# wholesale cost adjusted for loss
df['Cost_RMB'] = df['Quantity'] * df['Wholesale Price (RMB/kg)'] \
                 * (1 + df['Loss Rate (%)']/100)
df['Cost_INR'] = df['Cost_RMB'] * RMB_to_INR

df['Margin_INR'] = df['Sales_INR'] - df['Cost_INR']
df['ReturnRate'] = df['Quantity'].where(df['IsReturn'], 0) / df['Quantity']

# 3. (Optional) bring in item names/categories
df = df.merge(a1[['Item Code','Item Name','Category Name']],
              on='Item Code', how='left')
```

Quick peek at final schema

In [13]:

```
df.head()
```

Out[13]:

	Date	Time	Item Code	Quantity Sold (kilo)	Unit Selling Price (RMB/kg)	Sale or Return	Discount (Yes/No)	Quantity	UnitPric
0	2020-01-07	15:07.9	1.029000e+14	0.396	7.6	sale	No	0.396	
1	2020-01-07	17:27.3	1.029000e+14	0.849	3.2	sale	No	0.849	
2	2020-01-07	17:33.9	1.029000e+14	0.409	7.6	sale	No	0.409	
3	2020-01-07	19:45.4	1.029000e+14	0.421	10.0	sale	No	0.421	
4	2020-01-07	20:23.7	1.029000e+14	0.539	8.0	sale	No	0.539	

Bar chart of return spikes

In [14]:

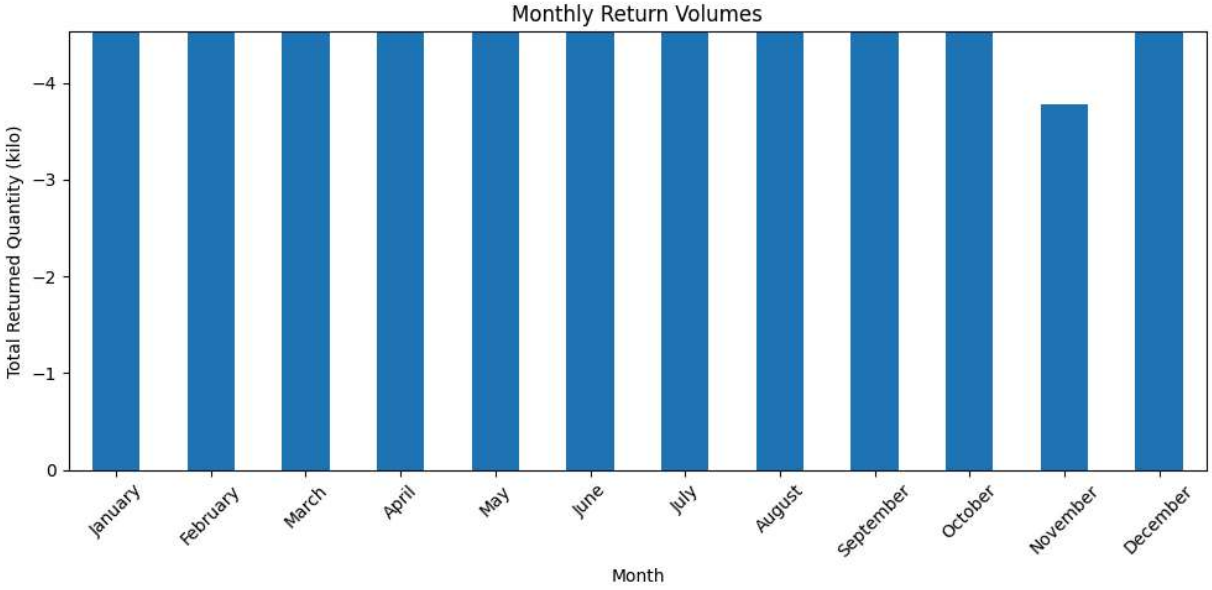
```
# 1. Re-flag returns more robustly
df['IsReturn'] = df['Sale or Return'].astype(str).str.strip().str.lower() == 'retur

# 2. Re-compute monthly_returns
df['Month'] = pd.to_datetime(df['Date'], errors='coerce').dt.month_name()
month_order = [
    'January','February','March','April','May','June',
    'July','August','September','October','November','December'
]
monthly_returns = (
    df[df['IsReturn']]
      .groupby('Month')['Quantity']
      .sum()
      .reindex(month_order)
      .fillna(0)
)

print("Monthly returns:\n", monthly_returns)

# 3. Plot with y-limit
import matplotlib.pyplot as plt
plt.figure(figsize=(10,5))
ax = monthly_returns.plot(kind='bar', title='Monthly Return Volumes')
ax.set_ylim(0, monthly_returns.max() * 1.2)
plt.ylabel('Total Returned Quantity (kilo)')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```

```
Monthly returns:
 Month
January       -8.069
February      -6.894
March         -9.615
April         -7.359
May           -8.839
June          -8.750
July         -16.981
August       -14.380
September     -9.878
October      -15.244
November      -3.772
December      -7.536
Name: Quantity, dtype: float64
```

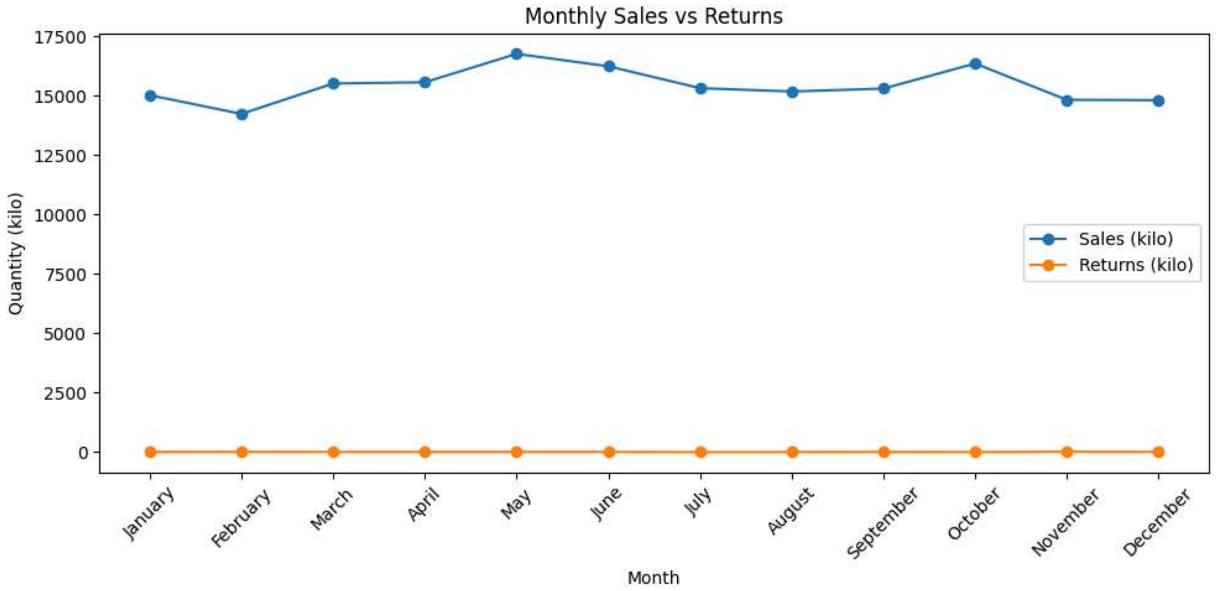


Sales vs Returns line chart

In [15]:

```
monthly_sales = df.groupby('Month')['Quantity'].sum().reindex(month_order)
monthly_returns = df[df['IsReturn']].groupby('Month')['Quantity'].sum().reindex(mon

plt.figure(figsize=(10,5))
plt.plot(monthly_sales.index, monthly_sales.values, marker='o', label='Sales (kilo)
plt.plot(monthly_returns.index, monthly_returns.values, marker='o', label='Returns
plt.title('Monthly Sales vs Returns')
plt.xlabel('Month')
plt.ylabel('Quantity (kilo)')
plt.legend()
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



Boxplot of discounted vs full-price margins

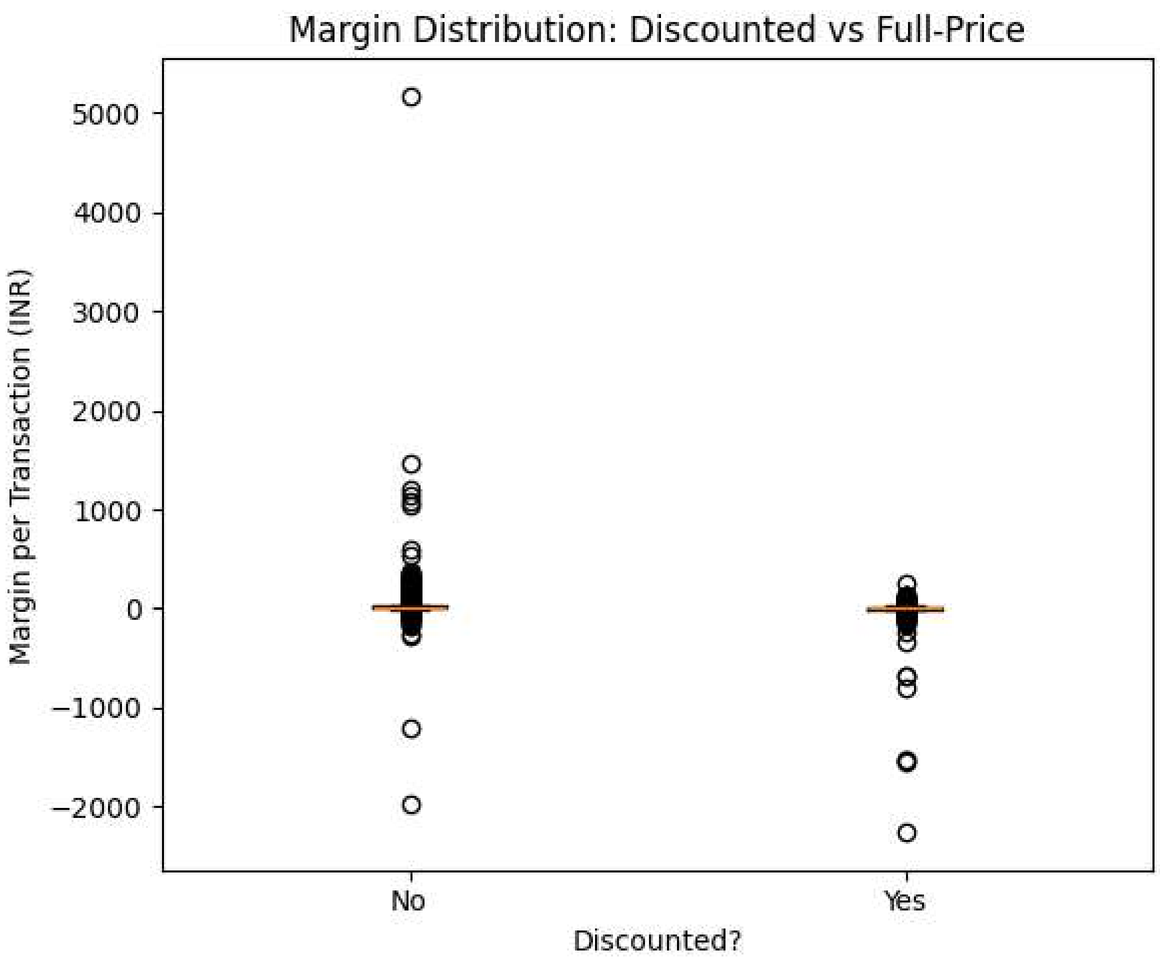
In [16]:

```
import matplotlib.pyplot as plt

# 1. Split your Margin_INR into two groups
m_full  = df.loc[df['Discount (Yes/No)'] == 'No',  'Margin_INR']
m_disc  = df.loc[df['Discount (Yes/No)'] == 'Yes', 'Margin_INR']

# 2. Plot side-by-side boxplots
plt.figure(figsize=(6,5))
plt.boxplot([m_full.dropna(), m_disc.dropna()],
            labels=['No', 'Yes'])
plt.title('Margin Distribution: Discounted vs Full-Price')
plt.ylabel('Margin per Transaction (INR)')
plt.xlabel('Discounted?')
plt.tight_layout()
plt.show()
```

```
C:\Users\Asus\AppData\Local\Temp\ipykernel_5696\3739414547.py:9: MatplotlibDeprecati
onWarning: The 'labels' parameter of boxplot() has been renamed 'tick_labels' since
Matplotlib 3.9; support for the old name will be dropped in 3.11.
  plt.boxplot([m_full.dropna(), m_disc.dropna()],
```

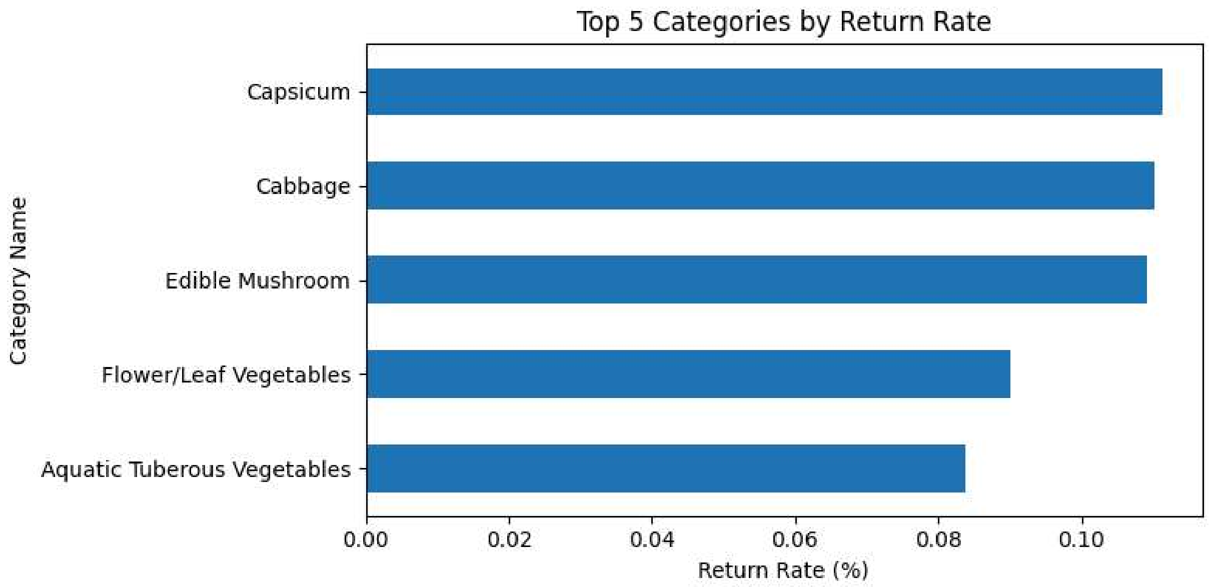


Top 5 categories by return rate

In [17]:

```
cat = (
    df.groupby('Category Name')
      .agg(TotalSold=('Quantity','sum'),
           Returns=('IsReturn','sum'))
)
cat['ReturnRatePct'] = 100 * cat['Returns'] / cat['TotalSold']
top5_cat = cat.sort_values('ReturnRatePct', ascending=False).head(5)

fig, ax = plt.subplots(figsize=(8,4))
top5_cat['ReturnRatePct'].plot(kind='barh', ax=ax, title='Top 5 Categories by Retur
ax.set_xlabel('Return Rate (%)')
ax.invert_yaxis()
plt.tight_layout()
plt.show()
```



10 worst-margin SKUs

In [18]:

```
worst_skus = (
    df.groupby(['Item Code', 'Item Name'])
      .agg(MarginSum=('Margin_INR','sum'))
      .sort_values('MarginSum')
      .head(10)
      .reset_index()
)
display(worst_skus)
```

	Item Code	Item Name	MarginSum
0	1.029000e+14	Hongshan Gift Box	-4602.660000
1	1.029000e+14	Hongshan Shoutidai	-2164.800000
2	1.029000e+14	Hongshan Caitai	-659.082831
3	1.029000e+14	Chicken Fir Bacteria	-205.397208
4	1.029000e+14	Caidian Quinoa Artemisia (Bag)	-138.904454
5	1.029000e+14	Round Eggplant (1)	-96.420933
6	1.029000e+14	Big Broccoli	-77.819637
7	1.029000e+14	Huanghuacai	-42.732540
8	1.029000e+14	White Jelly Mushroom	19.263030
9	1.029000e+14	Fruit Pepper (Orange)	19.979013