

The Case of the Unidentified Industries - 2013

Effi Benmelech

Kellogg School of Management

Why This Case?

- Refresher of financial ratios and analysis.
- Become familiar with the components of balance sheets and ratios that will be used during the course.
- Recognize the range of distinctive patterns of operations and asset structures in different industries.

$$\frac{\text{COGS}}{\text{Ending inventory}}$$

- Alternative definitions of inventory turnover include sales divided by ending inventory, or COGS divided by average inventory.
- COGS is a more appropriate numerator than sales since sales include a profit markup.

Inventory Turnover - cont'd

	C	H		E	G	N
COGS	44,754	9,852		11,444	1,364	20,535
Inventory	1,382	313		0	0	0
Inventory turnover	32.4	31.5		-	-	-

- Are C and H in the same industry?
- Why do E, G, and N have zero inventory?

Days Sales of Inventory (DSI)

$$\text{Inventory turnover} = \frac{\text{COGS}}{\text{Ending inventory}}$$

- We can modify the inventory turnover by taking its reciprocal and multiplying it by 365.

$$\text{DSI} = \frac{1}{\frac{\text{COGS}}{\text{Ending inventory}}} * 365 = \frac{\text{Ending inventory}}{\text{COGS}/365}$$

- DSI measures the time that it takes a company to turn its inventory into sales. Shorter DSI is better - but it varies across industries.

Inventory Turnover - cont'd

	C	H		A	B	L
COGS	44,754	9,852		45,971	5,156.5	7,568
Inventory	1,382	313		6,031	1,410.8	3,223.0
Inv. turnover	32.4	31.5		7.6	3.7	2.4
DSI	11.3 days	11.6 days		47.9 days	99.9 days	155.4 days

- How can C and H have such short DSIs?
- Why does L need a long DSI?

Receivables Collection Period

- Also known as Collection Period or Receivables Days.

$$\text{Collection period} = \frac{AR}{Sales/365}$$

- The collection period highlights a company's management of accounts receivables.
- We can think about the collection period as the average time lag between sale and receipt of cash from sales.

Receivables Collection Period - cont'd

	B	H	I	K	M		L	N
AR	149.4	301.0	1,051.0	2,167.0	332.0		2,717	1,547,065
Sales	6,839	13,633	96,751	71,633	17,088		19,624	70,173
AR Days	8.0	8.1	4.0	11.0	7.1		50.5	8,047

- Are B, H, I, K and M in the same industry?
- What is the business of L?
- What is the business of M?

- Also known as AP Days or DPO=Days Payable Outstanding.

$$\text{Payable period} = \frac{AP}{COGS/365}$$

- The payable period highlights a company's management of accounts payables.
- We can think about the payable period as the average time it takes the company to pay its suppliers.

Payable Period - cont'd

	H	I	K	M
AP	684.0	4,524.0	4,384.0	1,107.0
COGS	9,852	76,858	51,291	10,872
AP Days	25.3	21.5	31.2	37.2

- Why would you expect DPO to be under 30?
- When would you expect DPO to be under 10?

- 2% 10, NET 30: get 2% discount on invoice if paid within 10 days or pay in full in 30 days.
- Attractive to pay within 10 days:
 - Purchase for \$1000 and have the option of paying \$980 in 10 days or \$1000 in 30 days.
 - Equivalent to paying \$20 for the use of \$980 for 20 days.
 - $\$20/\$980=2.04\%$ for 20 days. Assuming that suppliers will not tolerate payments beyond 30 days - this can be annualized to 44%.
 - Take trade discounts if you can!
- But Accounts Payable are a source of financing!

- A company will stretch its DPO when it needs cash - however this is costly!
- Alternatively, a company with very strong bargaining power vis-à-vis its suppliers may be able to squeeze them in that they will agree to a longer payment period.

	A	D	L	N
AP	13,318.0	4,264.0	2,444.0	383,798.0
COGS	45,971	11,334	7,568	20,535.0
AP Days	105.7	137.3	117.9	6,821.8

- Think about retailers or manufacturers with strong bargaining power vis-à-vis their suppliers.

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}}$$

- Profit margin measures how much earnings are squeezed out of each dollar of sales.
- It reflects the company's pricing strategy and its ability to control operating costs.
- Profit margins differ greatly across industries depending on the nature of the goods sold and the company's competitive strategy.

$$\text{Asset turnover} = \frac{\text{Sales}}{\text{Assets}}$$

- Asset turnover measures the sales generated from each dollar of assets.
- It is a measure of asset intensity - low asset turnover implies an asset-intensive business.
- Asset turnovers differ greatly across industries depending on the nature of the industry.
- Asset turnover and profit margins tend to vary inversely - high profit margin firms tend to have low asset turnover because they require lots of assets in order to add value to a product such that it generates high profit margin.

Profit Margin vs. Asset Turnover

- Firms D and F have the highest net margins and fairly low asset turnover.
- In contrast, Firms I and K have very high asset turnover but very low net margins.

	D	F	I	K
Net margin	0.25	0.28	0.02	0.03
Asset turnover	0.32	0.55	3.93	2.14

- The correlation between profit margin and asset turnover among the 14 firms in the case is -0.48!
- What does this tell us about the firms? D and F likely to have unique products or patents that make them sort of monopolies. Firms I and K have generic products with low margins but very high turnover.

Return on Assets (ROA)

$$ROA = \frac{\text{Net income}}{\text{Assets}} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}$$

$$ROA = (\text{Profit margin}) \times (\text{Asset turnover})$$

- ROA measures the combined effect of margins and turns - it is the basic measure of efficiency with which a company allocates and manages its resources.
- Some companies achieve their ROAs by combining a high profit margin with low asset turnover while others do the reverse.

Return on Assets - cont'd

	D	J	F	H
Net margin	0.25	0.06	0.28	0.12
Asset turnover	0.32	1.50	0.55	1.51
Net margin*Asset turnover	0.08	0.09	0.15	0.18
Return on Assets	0.08	0.09	0.15	0.18

- Firms D and J have similar ROA but firm D has a higher net margin while firm J has a higher asset turnover.
- Firms F and H have similar ROA but firm F has a higher net margin while firm H has a higher asset turnover.

- A company increases its financial leverage when it raises the proportion of debt relative to equity used to finance the business.
- Unlike the profit margin and the asset turnover ratio – in which more is preferred to less – financial leverage is not something management necessarily wants to maximize.
- The challenge of financial leverage is to strike a prudent balance between the benefits and costs of debt financing. (We will discuss this in detail in the Capital Structure Lecture and the Bed Bath & Beyond Case).

Measuring Financial Leverage

- Balance sheet ratios.

$$\text{Debt to assets} = \frac{\text{LT Debt} + \text{debt in current liabilities}}{\text{Total assets}}$$

- Coverage ratios.

$$\text{Interest Coverage} = \frac{\text{EBIT}}{\text{Interest expense}}$$

$$\text{Debt Burden Coverage} = \frac{\text{EBIT}}{\text{Interest} + \frac{\text{Principal repayment}}{1 - \text{tax rate}}}$$

Financial Leverage

	A	F	G		H	I	J
Debt/Assets	0.09	0.11	0.10		0.33	0.36	0.39
EBIT/Interest expense	7.35	63.06	10.55		13.57	5.98	8.05

- Some firms may have higher EBIT and hence have better coverage ratio although they also have a lot of debt (compare J and A for example).

- By far the most popular yardstick of financial performance among investors and senior managers is the return on equity (ROE).

$$ROE = \frac{\text{Net income}}{\text{Shareholders' equity}}$$

- It measures the earnings per dollar of invested equity capital or, equivalently, the percentage return to owners on their investment.
- ROE is a measure of bang for the buck.

The Three Determinants of ROE

- We can rewrite ROE in terms of its three principal components:

$$ROE = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Shareholders' equity}}$$

- Note that $\frac{\text{Assets}}{\text{Shareholders' equity}}$ is also another measure of financial leverage:

$$\frac{\text{Assets}}{\text{Equity}} = \frac{\text{Liabilities} + \text{Equity}}{\text{Equity}} = 1 + \frac{\text{Liabilities}}{\text{Equity}}$$

- and $\frac{\text{Liabilities}}{\text{Equity}}$ is clearly a measure of financial leverage.

The Three Determinants of ROE - cont'd

- We can rewrite ROE in terms of its three principal components:

$$ROE = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Shareholders' equity}}$$

$$ROE = (\text{Profit margin}) \times (\text{Asset turnover}) \times (\text{Financial leverage})$$

- Management has three levers for controlling ROE:
 - ① Earning squeezed from each dollar of sales - **profit margin**.
 - ② Sales generated from each dollar of assets employed - **asset turnover**.
 - ③ Amount of equity used to finance the assets - **financial leverage**.

Identifying the Industries

- We now turn to match the firms to the industries using financial ratios.
- Rather than jumping and trying to identify the industries from the list of 14 - let's think of a group of industries that could possibly be broken off from the whole list.
- Which ratios so far seem interesting/unique?

Inventory Turnover

	E	G	M	N
Inventory	0	0	0	0
Inventory turnover	-	-	-	-

- Which industries are unlikely to have inventories?
- You need large inventories in retail (brick and mortar and online), utilities, computer vendors, manufacturing, restaurants.

- Most common in the service industry.
- We have four service providers to match to columns E, G, M and N:
 - Airline
 - Commercial Bank
 - Parcel Delivery Service
 - Social Networking Service

Which one is the Bank?

- Let's look into AR and AP.

	E	G	M	N
AR Days	41	52	7.1	8,047
AP Days	137.3	62.6	37.2	6,821

- N is being paid back in 8,047 days (22 years) - this looks like mortgages. N will pay its suppliers in 18.7 years - this looks like long-term bonds.
- N has no PP&E - no fixed assets but mostly financial assets.
- N is a bank.

Identifying the Industries

	Industry	Name
A	?	?
B	?	?
C	?	?
D	?	?
E	Service	?
F	?	?
G	Service	?
H	?	?
I	?	?
J	?	?
K	?	?
L	?	?
M	Service	?
N	Commercial bank	Citigroup

Which one is the Social Networking Service?

- Look into Property Plant & Equipment:

	E	G	M
PPE	46	16	69

- Need a lot of PP&E for a Parcel Delivery Service company or an airline.
- Not so much for social networking.

Identifying the Industries

	Industry	Name
A	?	?
B	?	?
C	?	?
D	?	?
E	Service	?
F	?	?
G	Social Network	Facebook
H	?	?
I	?	?
J	?	?
K	?	?
L	?	?
M	Service	?
N	Commercial bank	Citigroup

Which one is the Airline and which is the Parcel Delivery Company?

- Let's look into AR days.

	E	M
AR Days	41	7.1

- M is being paid much faster than E.
- Parcel delivery service typically deals with businesses shipping to customers - we should expect their receivable collection periods to be higher than airlines which typically deal directly with consumers who pay immediately.

Identifying the Industries

	Industry	Name
A	?	?
B	?	?
C	?	?
D	?	?
E	Parcel Delivery	UPS
F	?	?
G	Social Network	Facebook
H	?	?
I	?	?
J	?	?
K	?	?
L	?	?
M	Airline	Southwest
N	Commercial bank	Citigroup

Receivables Collection Period

- We can think about the collection period as the average time lag between sale and receipt of cash from sales.
- Firms who receive payment in cash or by credit cards issued by unrelated entity (Visa, MasterCard) will have shorter collection period.
- Business to Business transactions typically involve credit terms of at least 30 days.
- Let's look into firms with AR collection periods of fewer than 30 days.

Receivables Collection Period - cont'd

	I	B	H	K	A
AR Days	4.0	8.0	8.1	11.0	20

- Since they sell mostly to consumers as evident from their short AR collection period they are all likely to be retailers.
- We have six retailers in the firm descriptions:
 - Bookstore chain
 - Department store chain
 - Online retailer
 - Restaurant chain
 - Retail drug chain
 - Retail grocery chain
- We can eliminate the department store chain with its “own brand” charge card since this firm almost certainly has a collection period in excess of 30 days.

Identifying Retailers

	I	B	H	K	A
AR Days	4.0	8.0	8.1	11.0	20
Inventory turnover	14.9	3.7	31.5	7.3	7.6
PPE/Assets	60	16	47	36	22

- We would expect (hope?) that the restaurant chain would have a very fast inventory turnover - also mostly a cash business so AR is low. So H is the restaurant chain.
- Also, the bookstore likely to have slowest inventory turnover - much lower than the rest - so B is the bookstore chain.

Identifying the Industries

	Industry	Name
A	?	?
B	Bookstore chain	Barnes and Noble
C	?	?
D	?	?
E	Parcel Delivery	UPS
F	?	?
G	Social Network	Facebook
H	Restaurant chain	Yum!
I	?	?
J	?	?
K	?	?
L	?	?
M	Airline	Southwest
N	Commercial bank	Citigroup

Identifying Retailers

	I	K	A
AR Days	4.0	11.0	20
Inventory turnover	14.9	7.3	7.6
PPE/Assets	60	36	22

- We now need to match I, K and A into grocery store chain, online retailer, and retail drug chain.
- With fresh produce, dairy and meats, the grocery chain should have the fastest turnover rate and also more fixed-assets as it needs to invest in refrigeration assets - I is the grocery store.
- Between retail drug store and online retailer, the online retailer should have fewer fixed assets (PP&E), thus A is the online retailer and K is the retail drug store.

Identifying the Industries

	Industry	Name
A	Online Retailer	Amazon
B	Bookstore chain	Barnes and Noble
C	?	?
D	?	?
E	Parcel Delivery	UPS
F	?	?
G	Social Network	Facebook
H	Restaurant chain	Yum!
I	Retail Grocery chain	Kroger
J	?	?
K	Retail Drug chain	Walgreens
L	?	?
M	Airline	Southwest
N	Commercial bank	Citigroup

C	D	F	J	L
---	---	---	---	---

- We are left with five firms to identify. These are:
 - Online vendor of PC
 - Pharmaceutical manufacturer
 - Computer software developer
 - Department store chain
 - Electric and gas utility

The Last Five

	C	D	F	J	L
Inventory turnover	32.4	1.6	10.4	5.5	2.3
PPE/Assets	4	8	7	32	60
Inventory/Assets	3	4	1	17	3
AR Days	63	77	82	64	51
Net Profits/Revenue	0.042	0.247	0.281	0.061	0.090

- L has very high PPE and low inventory - must be the electric and gas utility.
- Dramatic inventory turnover of 32.4 for firm C - this is the online vendor of PC - outsource all manufacturing and have the inventories reside on the balance sheets of the contracts electronics manufacturers.

Identifying the Industries

	Industry	Name
A	Online Retailer	Amazon
B	Bookstore chain	Barnes and Noble
C	Online Computer Vendor	Dell
D	?	?
E	Parcel Delivery	UPS
F	?	?
G	Social Network	Facebook
H	Restaurant chain	Yum!
I	Retail Grocery chain	Kroger
J	?	?
K	Retail Drug chain	Walgreens
L	Utility	Duke Energy
M	Airline	Southwest
N	Commercial bank	Citigroup

The Last Three

	D	F	J
Inventory turnover	1.6	10.4	5.5
PPE/Assets	8	7	32
Inventory/Assets	4	1	17
AR Days	77	82	64
Net Profits/Revenue	0.247	0.281	0.061

- High PPE of J so cannot be the computer software developer.
- Highest inventory of J so must be the department store.
- Tough call between D and F. High inventory turnover more likely for software company than a pharma. Also D has a higher leverage ratio than F and software companies tend to have lower debt ratios. So D is the pharma and F is the software company.

Full Match

	Industry	Name
A	Online Retailer	Amazon
B	Bookstore chain	Barnes and Noble
C	Online Computer Vendor	Dell
D	Pharma	Pfizer
E	Parcel Delivery	UPS
F	Software	Microsoft
G	Social Network	Facebook
H	Restaurant chain	Yum!
I	Retail Grocery chain	Kroger
J	Department Store chain	Nordstrom
K	Retail Drug chain	Walgreens
L	Utility	Duke Energy
M	Airline	Southwest
N	Commercial bank	Citigroup