Arcelor-Mittal Takeover Case

In [2]:

```
import pandas as pd
import xlrd
```

In [3]:

```
import numpy as np
import matplotlib.pyplot as plt
import random
import math
import statistics
import seaborn as sns
```

In [5]:

```
import tabula
```

In [22]:

```
import warnings
warnings.filterwarnings("ignore")
```

In [ ]:

```

```

Q1

What is the market's estimate of the synergy in the merger? Use different assumptions about the measurement horizon. Note that before the first acquisition attempt there were 640 million shares of Arcelor and 704 million shares of Mittal outstanding.

In [69]:

```
shs_arc = 640
shs_mit = 704
```

In [19]:

```
# tabula.read_pdf("S9.1_ACF_Arcelor_Mittal_Takeover.pdf", pages=11, pandas_optio
ns={"header":None})[0]
```

In [20]:

```
# tabula.read_pdf("S9.1_ACF_Arcelor_Mittal_Takeover.pdf", pages=12, pandas_optio
ns={"header":None})[0]
```

In [21]:

```
# tabula.read_pdf("S9.1_ACF_Arcelor_Mittal_Takeover.pdf", pages=13, pandas_optio
ns={"header":None})[0]
```

In [ ]:

```

```

In [36]:

```
pg1 = tabula.read_pdf("S9.1_ACF_Arcelor_Mittal_Takeover.pdf", pages=11, pandas_o
ptions={"header":None})[0]
pg1.drop(index=0, inplace=True)

pg2 = tabula.read_pdf("S9.1_ACF_Arcelor_Mittal_Takeover.pdf", pages=12, pandas_o
ptions={"header":None})[0]

pg3 = tabula.read_pdf("S9.1_ACF_Arcelor_Mittal_Takeover.pdf", pages=13, pandas_o
ptions={"header":None})[0]
pg3.drop(index=0, inplace=True)
```

In [28]:

```
stock_returns = pd.concat([pg1, pg2, pg3], ignore_index=True)
```

In [30]:

```
stock_returns.columns = ["Date", "Arcelor_Share_Price", "Arcelor_Excess_Return",
"Arcelor_Cummulative_Excess_Return",
                         "Mittal_Share_Price", "Mittal_Excess_Return", "Mittal_C
ummulative_Excess_Return"
                        ]
```

In [35]:

```
stock_returns
```

Out[35]:

	Date	Arcelor_Share_Price	Arcelor_Excess_Return	Arcelor_Cummulative_Excess_Return
0	02-Jan-06	2 1.14	1%	1%
1	03-Jan-06	2 1.27	-2%	-1%
2	04-Jan-06	2 1.94	2%	1%
3	05-Jan-06	2 1.90	0%	1%
4	06-Jan-06	2 1.89	-1%	-1%
...	...	...	...	...
147	26-Jul-06	4 3.00	8%	50%
148	27-Jul-06	4 2.40	-1%	49%
149	28-Jul-06	4 1.64	-4%	45%
150	31-Jul-06	4 1.75	0%	45%
151	01-Aug-06	4 2.00	2%	47%

152 rows × 7 columns

In [37]:

```
stock_returns.to_csv("stock_returns_arcelor_mittal_Jan2006_Aug2006.csv", index=False)
```

In [ ]:

```

```

In [44]:

```
stock_returns = pd.read_excel("parsed_arcelor_mittal_stock_returns_Jan2006_Aug2006.xlsx")
```

In [86]:

```
stock_returns.head()
```

Out[86]:

	Date	Arcelor_Share_Price	Mittal_Share_Price	Arcelor_Excess_Return	Arcelor_Cummulati
0	2006-01-02	21.14	23.27	0.01	
1	2006-01-03	21.27	22.50	-0.02	
2	2006-01-04	21.94	22.52	0.02	
3	2006-01-05	21.90	22.23	0.00	
4	2006-01-06	21.89	22.40	-0.01	

In [141]:

```
plt.figure(figsize=(18,10))
plt.plot(stock_returns.Date, stock_returns.Arcelor_Share_Price, label="Arcelor S
tock Price", scaley=False)
plt.plot(stock_returns.Date, stock_returns.Mittal_Share_Price, label="Mittal Sha
re Price")
plt.vlines(x='2006-01-26', ymin=10, ymax=50, label="Announcement", color="green"
)
plt.vlines(x='2006-07-14', ymin=10, ymax=50, label="Tender Offer Exp", color="re
d")
plt.legend(loc="upper left")
```

Out[141]:

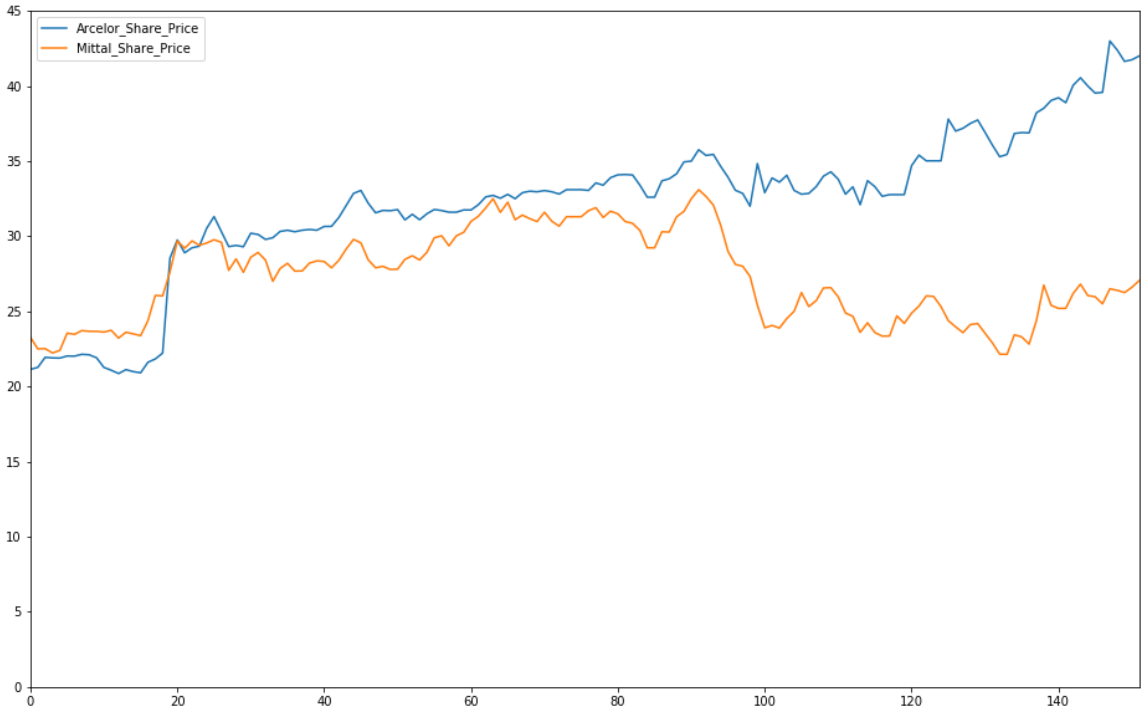
```
<matplotlib.legend.Legend at 0x7f86b54ddc10>
```

In [53]:

```
stock_returns[["Arcelor_Share_Price", "Mittal_Share_Price"]].plot(figsize=(16,10
), ylim=(0,45))
```

Out[53]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f86c44183d0>
```

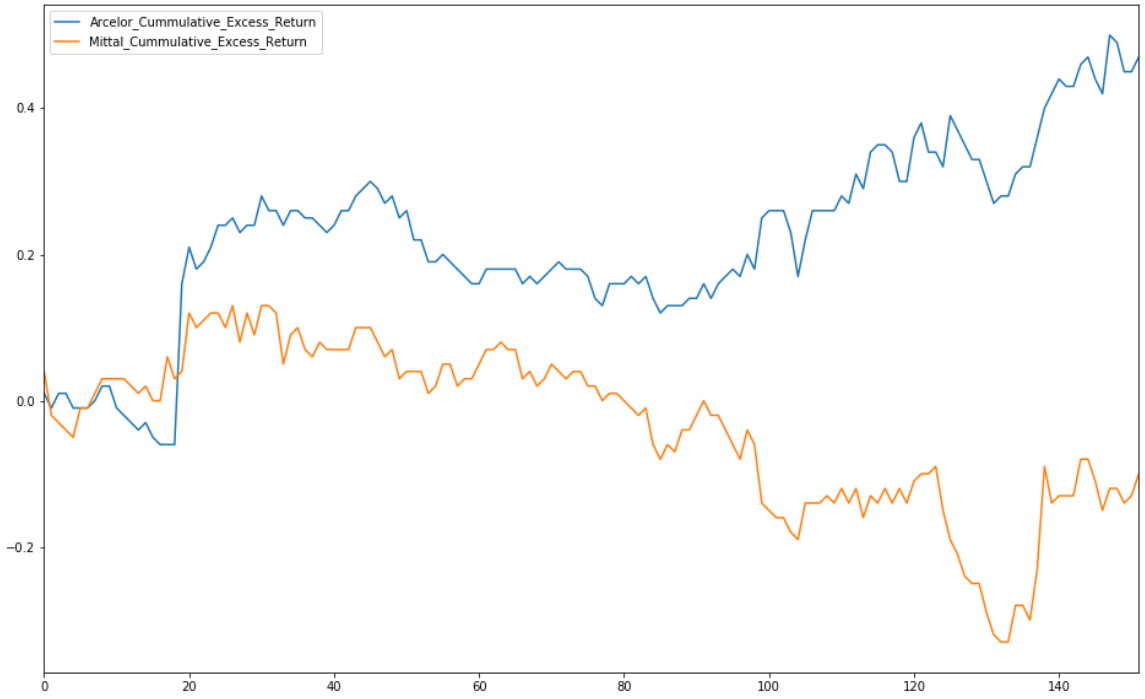


In [78]:

```
stock_returns[["Arcelor_Cummulative_Excess_Return", "Mittal_Cummulative_Excess_R
eturn"]].plot(figsize=(16,10))
```

Out[78]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f86c1a23890>
```



In [87]:

```
stock_returns.loc[stock_returns.Date == '2006-07-14']
```

Out[87]:

	Date	Arcelor_Share_Price	Mittal_Share_Price	Arcelor_Excess_Return	Arcelor_Cummul
139	2006-07-14	39.04	25.4	0.01	

In [88]:

```
mit_gain = 23.27 * shs_mit * stock_returns.Mittal_Cummulative_Excess_Return[139]
```

In [89]:

```
arc_gain = 21.14 * shs_arc * (1+stock_returns.Arcelor_Cummulative_Excess_Return[
139])
```

In [90]:

```
arc_gain, mit_gain
```

Out[90]:

```
(19212.032, -2293.4912000000004)
```

In [91]:

```
arc_gain + mit_gain
```

Out[91]:

```
16918.5408
```

In [100]:

```
# Announcement bid came on Jan 27 to Jan 28
```

In [114]:

```
stock_returns.iloc[:22]
```

Out[114]:

	Date	Arcelor_Share_Price	Mittal_Share_Price	Arcelor_Excess_Return	Arcelor_Cummulat
0	2006-01-02	21.14	23.27	0.01	
1	2006-01-03	21.27	22.50	-0.02	
2	2006-01-04	21.94	22.52	0.02	
3	2006-01-05	21.90	22.23	0.00	
4	2006-01-06	21.89	22.40	-0.01	
5	2006-01-09	22.03	23.55	0.00	
6	2006-01-10	22.02	23.47	0.00	
7	2006-01-11	22.14	23.72	0.01	
8	2006-01-12	22.11	23.67	0.02	
9	2006-01-13	21.91	23.67	0.00	
10	2006-01-16	21.27	23.62	-0.03	
11	2006-01-17	21.08	23.74	-0.01	
12	2006-01-18	20.86	23.22	0.00	
13	2006-01-19	21.12	23.61	-0.01	
14	2006-01-20	20.99	23.50	0.01	
15	2006-01-23	20.91	23.38	-0.02	
16	2006-01-24	21.61	24.38	-0.01	
17	2006-01-25	21.83	26.06	0.00	
18	2006-01-26	22.22	26.03	-0.01	
19	2006-01-27	28.54	27.63	0.23	
20	2006-01-30	29.75	29.69	0.05	
21	2006-01-31	28.90	29.20	-0.03	

In [ ]:

```
```

In [115]:

```
# using the pre and post announcement gains

(29.75-21.14) * shs_arc
```

Out[115]:

```
5510.4
```

In [116]:

```
(29.69 - 23.27) * shs_mit
```

Out[116]:

```
4519.680000000001
```

In [117]:

```
5510.4 + 4519.68
```

Out[117]:

```
10030.08
```

In [118]:

```
# adjust based on FP of 26
(29.75-26) * shs_arc, (29.69 - 23.27) * shs_mit
```

Out[118]:

```
(2400.0, 4519.680000000001)
```

In [119]:

```
2400 + 4519.68
```

Out[119]:

```
6919.68
```

In [ ]:

```
```

Q2

What is the management's estimate of the synergy? You can use the Arcelor-Mittal valuation spreadsheet on the course website or calculate it manually

In [96]:

```
mgmt_val = pd.read_clipboard()
```

In [98]:

```
mgmt_val.fillna(0)
```

Out[98]:

	DIM	2004	2005	2006	2007	2008	2009	
0	Discount Factor	0.0	0.0	1.000000	0.923088	0.852092	0.786556	0.79(
1	PV(FCF)	0.0	0.0	2118.439185	3893.833126	3608.278633	3851.207259	0.00(
2	Total PV(FCF)	0.0	0.0	13471.758203	0.000000	0.000000	0.000000	0.00(
3	Continuation Value (CV)	0.0	0.0	0.000000	0.000000	0.000000	0.000000	48489.69
4	PV(CV)	0.0	0.0	38306.856015	0.000000	0.000000	0.000000	0.00(
5	Enterprise Value {=Total PV(FCF) + PV(CV)}	0.0	0.0	51778.614219	0.000000	0.000000	0.000000	0.00(
6	- Financial Debt	0.0	0.0	18200.000000	0.000000	0.000000	0.000000	0.00(
7	- Minority Interest	0.0	0.0	4334.000000	0.000000	0.000000	0.000000	0.00(
8	+ Affiliates	0.0	0.0	2434.000000	0.000000	0.000000	0.000000	0.00(
9	- Pension Obligations	0.0	0.0	2889.000000	0.000000	0.000000	0.000000	0.00(
10	TOTAL EQUITY VALUE	0.0	0.0	28789.614219	0.000000	0.000000	0.000000	0.00(
11	Estimated Shares Outstanding (millions)	0.0	0.0	1417.000000	0.000000	0.000000	0.000000	0.00(
12	Equity Value (EUR per Share)	0.0	0.0	20.317300	0.000000	0.000000	0.000000	0.00(

2004 2005 2006 2007 2008 2009 CV

Discount Factor 1.00 0.92 0.85 0.79 0.79 PV(FCF) 2,118 3,894 3,608 3,851
Total PV(FCF) 13,472
Continuation Value (CV) 48,490 PV(CV) 38,307
Enterprise Value {=Total PV(FCF) + PV(CV)} 51,779

- Financial Debt 18,200
- Minority Interest 4,334
- Affiliates 2,434
- Pension Obligations 2,889
  TOTAL EQUITY VALUE 28,790
  Estimated Shares Outstanding (millions) 1,417
  Equity Value (EUR per Share) 20.32

	2004	2005	2006	2007	2008	2009	CV
Discount Factor			1.00	0.92	0.85	0.79	0.79
PV(FCF)			2,118	3,894	3,608	3,851	
Total PV(FCF)			13,472				
Continuation Value (CV)							48,490
PV(CV)			38,307				
Enterprise Value {=Total PV(FCF) + PV(CV)}			**51,779**				
- Financial Debt			18,200				
- Minority Interest			4,334				
+ Affiliates			2,434				
- Pension Obligations			2,889				
TOTAL EQUITY VALUE			**28,790**				
Estimated Shares Outstanding (millions)			**1,417**				
Equity Value (EUR per Share)			**20.32**				

In [99]:

```
shs_arc + shs_mit
```

Out[99]:

1344

In [120]:

```
21.14 * shs_arc + 23.27 * shs_mit
```

Out[120]:

29911.68

In [121]:

```
# mgmt
# year 1 = 0.5 B
# year 2 = 0.9 B
# year 3 on wards = 1.3 B
```

In [122]:

```
wacc = 0.08
```

In [123]:

```
sum([1.3/1.08**x for x in range(4,100)])
```

Out[123]:

12.891795778064116

In [124]:

```
0.5 + 0.9/1.08**2 + 12.89
```

Out[124]:

14.161604938271605

Q3

Given this information what should the be the maximum price Mittal can pay per share of Arcelor without destroying shareholder value?

In [152]:

```
14161.6/640
```

Out[152]:

22.1275

In [144]:

```
14.1616/2
```

Out[144]:

7.0808

In [145]:

```
7081/640
```

Out[145]:

11.0640625

In [147]:

```
# Arcelor stock price before announcement
22.22
```

Out[147]:

22.22

In [148]:

```
22.22 + 11.064
```

Out[148]:

```
33.284
```

In [153]:

```
22.22 + 22.1275
```

Out[153]:

```
44.3475
```

Q4

How does the market react to the various takeover defences employed by Arcelor? Calculate the abnormal returns starting one day before the announcement day until one day after around every major anti-takeover defence announcement. Which of the defensive tactics can be considered as a way to obtain a higher bid, rather than preserve independence at any cost? Use Arcelor Exhibit B that is posted on the website

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

Q5

Why does a repurchase tender offer not increase stock prices, in contrast to the typical case?

Total wealth created for all shareholders is best measured by the total *abnormal* return $Total_R$

$$Total_R = F_p * repurchasePremium + (1 - F_p) * CAR$$

Tender offers which predicted that the total abnormal return to all shareholders could be predicted by the following regression:

$$Total_R = 0.6 * Premium + 0.25 * PercOfSharesRepurchased$$

In [154]:

```
# stock before announcement was 22.22
(40 - 22.22) / 22.22
```

Out[154]:

```
0.8001800180018003
```

In [161]:

```
shs_arc / (shs_arc + shs_mit)
```

Out[161]:

```
0.47619047619047616
```

In [162]:

```
r_premium = 0.8001800180018003
0.6 * r_premium + 0.25 * .4762
```

Out[162]:

```
0.5991580108010801
```

In [163]:

```
22.22 * 1.5991580108010801
```

Out[163]:

```
35.533291
```

In [ ]:

In [ ]:

In [ ]:

Q6

Evaluate Mittal's financing strategy of the bid using the post-acquisition capital structure information.

In [ ]:

In [ ]: