

How to predict a turning point for stocks and shares – A classic approach

We are all familiar with charts of the stock values going down and then it suddenly turns up and continues to go up for a while. The same is true for the one going up that suddenly starts going down. This point when the shares change the direction is called the turning point.

So, a turning point in stocks, sometimes also known as an inflexion point or pivot point, is a moment when a significant change in the direction of the stock movements takes place.

We also know that this turning point becomes obvious only after we look at the past and we can clearly see the point where this change happened. The difficulty is that often the values change direction, but then for a while, they keep on oscillating up and/or down, before definitely setting the new upward or downward trend. How do we know that the turn that we see today is a genuine one and not just one of these regular ups and downs?

Before we proceed, we need to clarify one important term. When we use the word prediction in this specific context, we do not mean predicting the future turning points. This would be a bridge too far. What we mean is predicting, in this moment of time, that the turning point is actually taking place. The scenario is something like this: You check your stocks, and you conclude that the stocks are likely to start a downward, or upwards run. This enables you to take action, which is to sell, buy, or whatever else is on your mind.

The chartists tackled this specific problem a long time ago, and what we are going to show here is the mainstream method used by many analysts today.

The identification of a turning point starts with three values from the previous day. We retrieve the high, low and closing value of the stock. From these three values from the previous day, we calculate a simple average:

$$PP = \frac{High+Low+Close}{3} \quad (1)$$

This simple average is the Pivot Point value, or PP, and the foundation for identifying a potential turning point. However, this is just the beginning. This pivot point is our central point that is used to calculate some other critical values, called the support and resistance levels, residing on both sides of this pivot point. The support points are the points below the pivot points and the resistance points are above the pivot point.

Here are the formulae that analysts use to calculate the three support levels and the three resistance levels:

$$S1 = 2PP - High \quad (2)$$

$$S2 = PP - (High - Low) = PP - High + Low \quad (3)$$

$$S3 = Low - 2(High - PP) \quad (4)$$

S1, S2 and S3 are the support levels. Note that most of the time the actual daily prices will linger somewhere between these three values. They are the potential levels at which your actual price might change, and we'll explain this shortly.

$$R1 = 2PP - Low \quad (5)$$

$$R2 = PP + (High - Low) = PP + High - Low \quad (6)$$

$$R3 = High + 2(PP - Low) \quad (7)$$

R1, R2 and R3 are Resistance 1, 2 and 3 points. Just like the S1, S2 and S3, they indicate the level at which the price is likely to change in the opposite level.

Remember these two things: The resistance levels are the points at which the actual price is likely to change direction and start going DOWN (hence the word resistance as this is the point at which the actual price hits resistance and cannot climb any higher). The support levels are the points at which the actual price is likely to change direction and start going UP (the word support in this context means that the growth is supported from this level as the prices will not go down any further).

It would be logical of you to ask if we could quantify how likely it is that a price will change the direction (something like calculating the probability percentage). Unfortunately, there is no rigorous answer using this particular approach. These points are just a reasonable indication to be used as a judgement call.

Before we dive into a practical example, note that analysts and chartists might use different formulae for the turning points. Sometimes you will hear about Woodie's pivot points, Camarilla's pivot points, Fibonacci's pivot points, DeMark's pivot points, etc. We will stick to the ones shown here that are usually called the standard, basic or just floor points.

Calculations of the turning points in Excel are trivial and below we give a simple example in Fig 1. Clearly, cells B4:D4 come directly from the stock exchange and cells B6:B12 are calculated.

In this example, yesterday's high was 100, the low was 90 and the closing value was 98. From there, we calculated a simple average (cell B6) as 96. This is the Pivot Point and the basis for calculating the three support and three resistance points.

S1=92, S2=86 and S3=82. Again, what do they mean? They mean that there is a strong possibility that when the actual price reaches one of these levels it might turn upwards. Remember, the word "support" means the lowest level from which only an upward trend is possible. Effectively, the values are supported not to drop below this level.

	A	B	C	D
1	Pivot Points			
2				
3		High	Low	Close
4	Price	100	90	98
5				
6	PP	96	=AVERAGE(B4:D4)	Pivot point
7	S1	92	=(2*B6)-B4	Support 1
8	S2	86	=B6-(B4-C4)	Support 2
9	S3	82	=C4-2*(B4-B6)	Support 3
10	R1	102	=(2*B6)-C4	Resistance 1
11	R2	106	=B6+(B4-C4)	Resistance 2
12	R3	112	=B4+2*(B6-C4)	Resistance 3

Fig 1. An example of calculating the pivot point and the support and resistance points

R1=102, R2=106 and R3=112. What do they mean? They mean that there is a strong possibility that when the actual price reaches one of these three levels it might turn downwards. Again, remember that the word “resistance” means the highest level from which only a downward trend is possible. The values kind of resist going higher.

To visualise this, we created a crude graph below in Fig 2 that shows the PP as a red line and S1-S3 as well as R1-R3 as blue lines parallel with the PP line. This effectively creates a “corridor” where the potential turning point might happen. We also are showing a current price as a dot at the value of exactly 100. If this dot was identical in value to one of the S1-S3 and R1-R3 points, this would indicate a potential turning point.

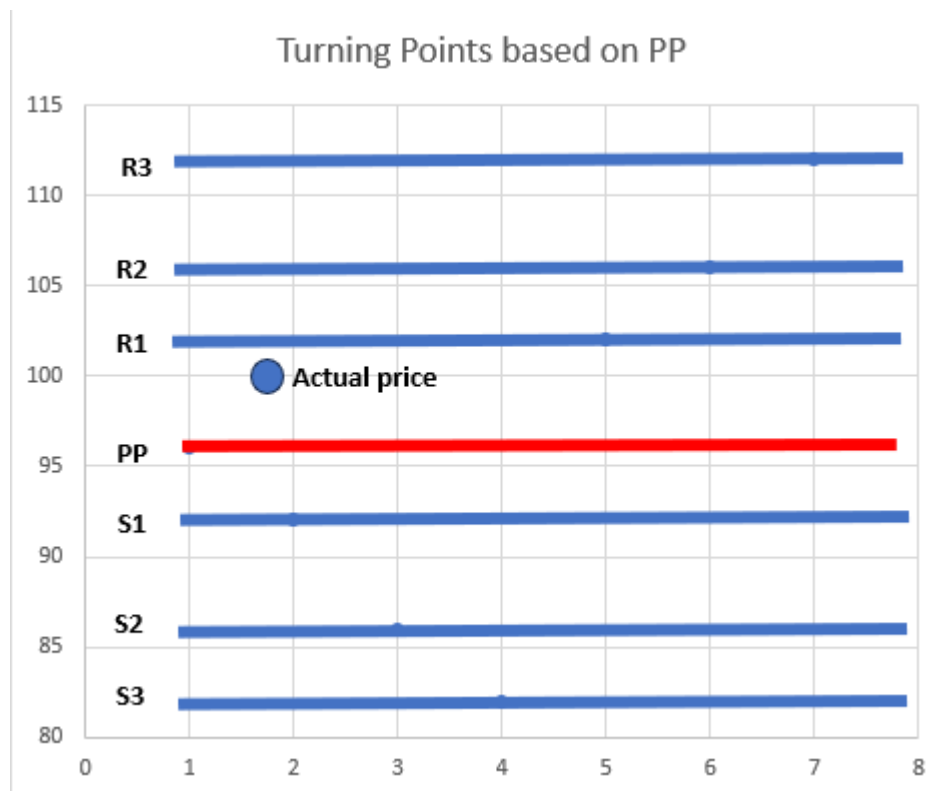


Fig 2. The actual price shown with the PP, R1-R3 and S1-S3 points

Just one more important point. Some analysts will say that the basis for calculating the daily PP, S1-S3 and R1-R3 should be the High, Low and Close from the previous month, not the previous day. Unfortunately, if you do this you will not get any meaningful information. You will just get a signal that this day is below or above the last month, but not a clear change in direction, i.e. an indication of a turning point. For this reason, to calculate daily PP, S1-S3 and R1-R3 we are using the previous day’s High, Low and Close values.

We’ll now use the actual example from a stock exchange, and for this purpose, I picked the daily closing values of Glaxo Smith Kline (GSK) from the London Exchange between 7 March 2023 and 8 September 2023. The closing values moved as shown in Fig 3 below.

As we can see, either three or five arbitrary regimes of trends define this period, and we just sketched the trend lines to depict these regimes. This is a general problem with the definition of a turning point. It depends on how deeply you zoom into the time series, as this will define your perspective of what is the turning point. The deeper you zoom in, the more turning points you will find. However, I will leave this discussion for some other time and just follow the method.

Let's concentrate on the chart on the left of Fig 3. Initially, the stocks grow until mid-April, then they continue to fall until mid-July, in order to start growing until the last date in this chart. When we say that the values either grow or decline, in reality, they only follow a straight line (a linear trend). These movements oscillate up and down, but the overall trend is quite perceptible.



Fig 3. GSK closing prices and a depiction of possible trend lines

According to the chart on the left in Fig 3, two turning points are indicated. Could we have predicted them using this classic approach to calculating standard pivot points?

We think that this is possible, at least to a certain extent, and we are going to show how to use the support and resistance values to figure this out. We'll use the same GSK shares values, as shown in Fig 3, but in addition to their closing daily values, we also need daily High and Low prices (we included Open price too as this is a standard printout when extracting the stock data).

Below in Fig 4, we have just the first few rows of the table that contain 129 rows.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Date (GSK)	Open	High	Low	Close	PP	S1	S2	S3	R1	R2	R3	Point of change
2	07/03/2023	1,432.60	1,452.60	1,428.80	1,441.80								
3	08/03/2023	1,435.40	1,436.80	1,422.40	1,422.40	1441.07	1429.53	1417.27	1405.73	1453.33	1464.87	1477.13	Possibly down
4	09/03/2023	1,418.40	1,429.00	1,411.40	1,412.20	1427.20	1417.60	1412.80	1403.20	1432.00	1441.60	1446.40	Likely down
5	10/03/2023	1,408.80	1,413.40	1,389.00	1,398.60	1417.53	1406.07	1399.93	1388.47	1423.67	1435.13	1441.27	Likely down
6	13/03/2023	1,400.00	1,400.00	1,375.20	1,376.60	1400.33	1387.27	1375.93	1362.87	1411.67	1424.73	1436.07	Possibly down
7	14/03/2023	1,381.40	1,391.60	1,371.60	1,380.40	1383.93	1367.87	1359.13	1343.07	1392.67	1408.73	1417.47	
125	01/09/2023	1,392.40	1,393.40	1,384.00	1,387.60	1394.27	1383.33	1377.87	1366.93	1399.73	1410.67	1416.13	
126	04/09/2023	1,391.60	1,395.40	1,372.20	1,373.60	1388.33	1383.27	1378.93	1373.87	1392.67	1397.73	1402.07	Definitely down
127	05/09/2023	1,367.40	1,390.40	1,363.00	1,381.40	1380.40	1365.40	1357.20	1342.20	1388.60	1403.60	1411.80	
128	06/09/2023	1,366.00	1,380.60	1,359.60	1,376.60	1378.27	1366.13	1350.87	1338.73	1393.53	1405.67	1420.93	
129	07/09/2023	1,369.60	1,390.20	1,365.22	1,388.20	1372.27	1363.93	1351.27	1342.93	1384.93	1393.27	1405.93	Possibly up
130	08/09/2023	1,395.40	1,448.60	1,390.40	1,444.20	1381.21	1372.21	1356.22	1347.23	1397.19	1406.19	1422.18	Definitely up

Fig 4. The first several rows of calculation PP, R1-R3 and S1-S3 for GSK stocks

Columns A:E are self-explanatory, so let's just show the formulas for the first row of columns F:L.

$$F3 = \text{AVERAGE}(C2:E2)$$

$$G3 = 2 * F3 - C2$$

$$H3 = F3 - (C2 - D2)$$

$$I3 = D2 - 2 * (C2 - F3)$$

$$J3 = 2 * F3 - D2$$

$$K3 = F3 + (C2 - D2)$$

$$L3 = C2 + 2 * (F3 - D2)$$

Cell F3 is the average of the previous day's High, Low and Close price, so it represents the Pivot Point. This value of F3 is then used in G3:L3 to calculate S1-S3 and R1-R3, as per the formulae above. These values were copied down to the last row.

In the graph below, Fig 5, a thick blue line shows the closing daily values over that period of time and dotted blue and yellow lines show the R1 and R2, whilst the dashed grey and black lines show the S1 and S2 (we did not include S3 and R3 to preserve some clarity of the graph).

In this graph, we are using the closing value of the stocks to demonstrate that we could have indicated turning points using this method. In reality, to predict the turning point in real-time, you would use the actual values from the stock exchange as they are published in real-time. We'll explain this.

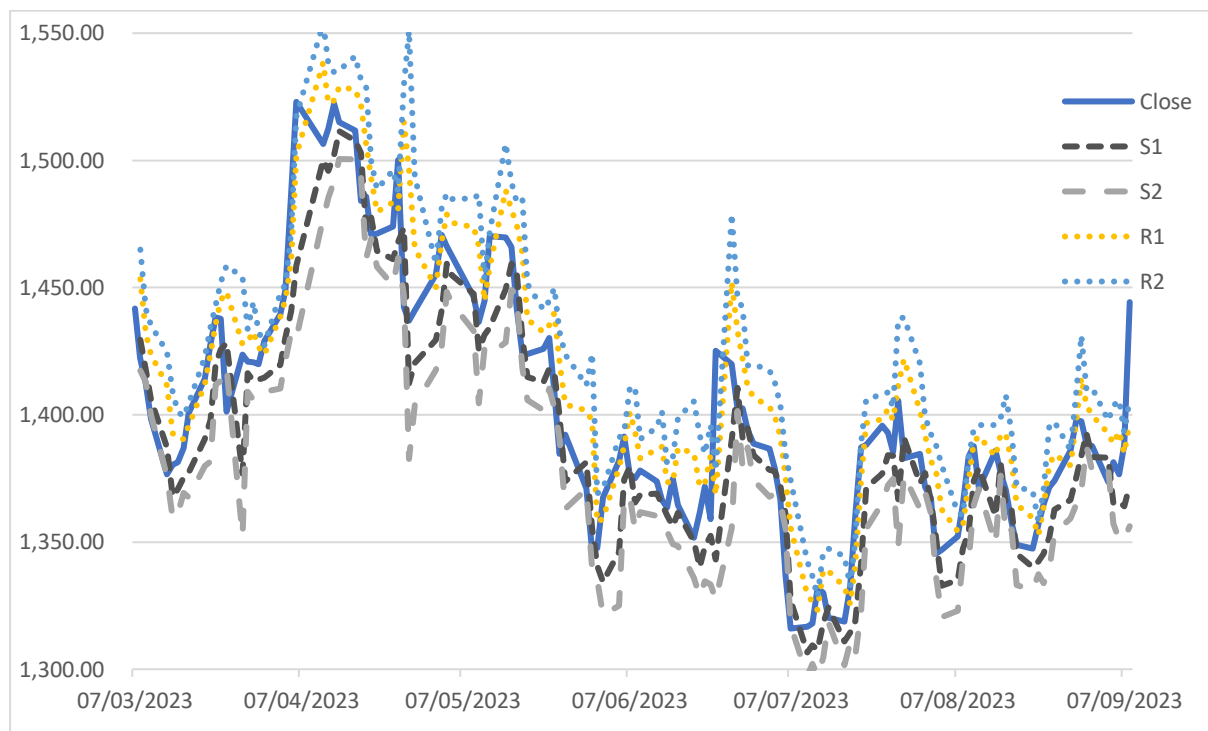


Fig 5. The closing values and the associated S1-S2 and R1-R2 points for GSK stocks

OK now we calculated everything and have a graph, the question is how do we use all these values to predict the turning point? To answer this question, take a look at column M in Fig 4. It contains a very long function:

```
F3=IF(E3<I3,"Definitely down",IF(AND(E3<G3,E3<H3),"Likely down",IF(E3<G3,"Possibly down",IF(E3>L3,"Definitely up",IF(AND(E3>J3,E3>K3),"Likely up",IF(E3>J3,"Possibly up",""))))))
```

The logic behind this function is that if the closing value goes below R1, the stock price is possibly going down. If it goes below R2, then it is very likely that the price is going down. If it goes below R3, then the price is almost definitely going down. The same applies to S1-S3, but with the opposite effect. Individually, these statements are captured as simple Excel functions. For the resistance points:

```
=IF(E3<G3,"Possibly down", "")
```

```
=IF(AND(E3<G3,E3<H3),"Likely down", "")
```

=IF(E3<I3,"Definitely down","")

For the support points:

=IF(E3>J3,"Possibly up","")

=IF(AND(E3>J3,E3>K3),"Likely up","")

=IF(E3>L3,"Definitely up","")

If we combine all these functions into one single line, we get the function as per column M in Fig 4.

By analysing what is shown in column M, and especially given that we know historically that turning points happened mid-April (the beginning of the downward trend) and then again in mid-July (an upward trend), let's see if we can spot the change in direction.

In Fig 6 below, we highlighted in green approximately mid-April, when we know the change happened. As we can see, row 30 in cell M3 indicates a definite end of the trend and hints that the stock will go down.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Date (GSK)	Open	High	Low	Close	PP	S1	S2	S3	R1	R2	R3	Point of change
24	06/04/2023	1,495.00	1,531.00	1,492.60	1,523.00	1473.73	1458.67	1430.13	1415.07	1502.27	1517.33	1545.87	Likely up
25	11/04/2023	1,517.00	1,527.60	1,501.20	1,506.40	1515.53	1500.07	1477.13	1461.67	1538.47	1553.93	1576.87	
26	12/04/2023	1,507.40	1,524.40	1,503.00	1,512.60	1511.73	1495.87	1485.33	1469.47	1522.27	1538.13	1548.67	
27	13/04/2023	1,515.00	1,524.40	1,507.00	1,522.40	1513.33	1502.27	1491.93	1480.87	1523.67	1534.73	1545.07	
28	14/04/2023	1,528.40	1,533.60	1,513.40	1,515.00	1517.93	1511.47	1500.53	1494.07	1528.87	1535.33	1546.27	
29	17/04/2023	1,520.20	1,522.78	1,504.00	1,511.80	1520.67	1507.73	1500.47	1487.53	1527.93	1540.87	1548.13	
30	18/04/2023	1,517.80	1,517.80	1,484.00	1,484.00	1512.86	1502.94	1494.08	1484.16	1521.72	1531.64	1540.51	Definitely down
31	19/04/2023	1,479.60	1,491.40	1,476.20	1,485.80	1495.27	1472.73	1461.47	1438.93	1506.53	1529.07	1540.33	
32	20/04/2023	1,477.80	1,482.20	1,467.00	1,470.80	1484.47	1477.53	1469.27	1462.33	1492.73	1499.67	1507.93	Possibly down
33	21/04/2023	1,463.40	1,486.00	1,463.40	1,471.20	1473.33	1464.47	1458.13	1449.27	1479.67	1488.53	1494.87	
34	24/04/2023	1,477.20	1,481.60	1,468.60	1,474.00	1473.53	1461.07	1450.93	1438.47	1483.67	1496.13	1506.27	
35	25/04/2023	1,466.40	1,503.00	1,461.69	1,500.20	1474.73	1467.87	1461.73	1454.87	1480.87	1487.73	1493.87	Definitely up
36	26/04/2023	1,494.00	1,521.20	1,437.00	1,442.20	1488.30	1473.59	1446.98	1432.28	1514.90	1529.61	1556.22	Likely down
37	27/04/2023	1,447.40	1,477.00	1,432.00	1,437.00	1466.80	1412.40	1382.60	1328.20	1496.60	1551.00	1580.80	
38	28/04/2023	1,426.80	1,447.60	1,426.80	1,441.00	1448.67	1420.33	1403.67	1375.33	1465.33	1493.67	1510.33	

Fig 6. Identifying a turning point in GSK stocks in mid-April

Unfortunately, we had one excessive day (25 April 2023, highlighted in orange colour) when the stocks bounced strongly up for just one day. This triggered the signal that the stock was definitely going up, but it was a fake signal. I think traders call this a dead-cat bounce. Not a nice expression, but quite picturesque.

Again we highlighted in green the mid-June when the next change in trend was expected, and indeed row 75 shows a definite uptrend signal.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Date (GSK)	Open	High	Low	Close	PP	S1	S2	S3	R1	R2	R3	Point of change
64	08/06/2023	1,375.00	1,383.80	1,369.40	1,375.20	1382.73	1365.47	1354.74	1337.47	1393.46	1410.73	1421.46	
65	09/06/2023	1,386.00	1,386.00	1,368.60	1,378.00	1376.13	1368.47	1361.73	1354.07	1382.87	1390.53	1397.27	
66	12/06/2023	1,391.60	1,392.36	1,369.88	1,373.80	1377.53	1369.07	1360.13	1351.67	1386.47	1394.93	1403.87	
67	13/06/2023	1,372.60	1,374.40	1,361.20	1,366.60	1378.68	1365.00	1356.21	1342.53	1387.48	1401.16	1409.95	
68	14/06/2023	1,365.80	1,376.20	1,359.20	1,363.40	1367.40	1360.40	1354.20	1347.20	1373.60	1380.60	1386.80	
69	15/06/2023	1,361.60	1,385.60	1,360.40	1,374.80	1366.27	1356.33	1349.27	1339.33	1373.33	1383.27	1390.33	Possibly up
70	16/06/2023	1,376.20	1,390.84	1,356.20	1,364.60	1373.60	1361.60	1348.40	1336.40	1386.80	1398.80	1412.00	
71	19/06/2023	1,370.40	1,380.40	1,348.60	1,351.80	1370.55	1350.25	1335.91	1315.61	1384.89	1405.19	1419.53	
72	20/06/2023	1,346.00	1,371.00	1,346.00	1,361.60	1360.27	1340.13	1328.47	1308.33	1371.93	1392.07	1403.73	
73	21/06/2023	1,348.80	1,376.80	1,345.40	1,371.80	1359.53	1348.07	1334.53	1323.07	1373.07	1384.53	1398.07	
74	22/06/2023	1,362.40	1,362.40	1,337.00	1,359.00	1364.67	1352.53	1333.27	1321.13	1383.93	1396.07	1415.33	
75	23/06/2023	1,390.00	1,444.00	1,382.26	1,425.20	1352.80	1343.20	1327.40	1317.80	1368.60	1378.20	1394.00	Definitely up
76	26/06/2023	1,432.20	1,437.00	1,414.60	1,419.80	1417.15	1390.31	1355.42	1328.57	1452.05	1478.89	1513.78	

Fig 7. Identifying a turning point in GSK stocks in mid-June

In mid-June, on 15/06/2023 we have an indication that the trend is going possibly up. This was confirmed on 23/06/2023 (we coloured this line in orange).

Just to ensure clarity, In the graph below in Fig 8, we are showing the last row calculations, i.e. the calculations for the “current” day, which in this case was 8 September 2023.

If you take a look at the spreadsheet from Figs 6 and 7, you will see that this approach signals more than just two turning points, as speculated on the left-hand side of Fig 3. It is more in tune with the picture on the right-hand side of Fig 3.

Columns A:E are the data imported from the stock exchange. Columns F:L show the calculation of the PP and related S1-S3 and R1-R3. The formulae for the last cells in row 30 are given below in every respective column.

To recap, in Fig 8, the top graph in Fig 8 covers columns A:I and the bottom one shows column A and columns J:M (with B:I hidden). The last cell in column M (M130) contains the IF formula that evaluates if the turning point has been reached.

	A	B	C	D	E	F	G	H	I
1	Date (GSK)	Open	High	Low	Close	PP	S1	S2	S3
128	06/09/2023	1,366.00	1,380.60	1,359.60	1,376.60	1378.27	1366.13	1350.87	1338.73
129	07/09/2023	1,369.60	1,390.20	1,365.22	1,388.20	1372.27	1363.93	1351.27	1342.93
130	08/09/2023	1,395.40	1,448.60	1,390.40	1,444.20	1381.21	1372.21	1356.22	1347.23
131						=AVERAGE(C129:E129)			
132							=2*F130-C129		
133								=F130-(C129-D129)	
134									=D129-2*(C129-F130)

	A	J	K	L	M	T	U	V	W	X	Y	Z	AA	AB
1	Date (GSK)	R1	R2	R3	Point of change									
128	06/09/2023	1393.53	1405.67	1420.93										
129	07/09/2023	1384.93	1393.27	1405.93	Possibly up									
130	08/09/2023	1397.19	1406.19	1422.18	Definitely up									
131														
132														
133														
134														
135														

Fig 8. Formulae for calculating the key turning points

OK, this was our attempt to assess if the method works and to see if we could “spot” the historical turning points. It definitely produces good indications, but it also produces a number of either “fake” signals, or redundant signals that do not help with clearly and unambiguously identifying the turning point.

Still, let’s try to simulate how to assess, in real-time, if we are hitting a turning point.

Below is a chart that shows just the GSL stock movements between the 7th and 20th November. We have all our PP, R1-R3 and S1-S3 calculated in columns F:L. As we can see on the 9th we had an indication that the shares were going possibly down and on the 10th this was confirmed as we got an indication that they were likely going down. On the 14th we have a firm indication stating that the shares are definitely going down.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Date (GSK)	Open	High	Low	Close	PP	S1	S2	S3	R1	R2	R3	Point of change
2	07/11/2023	1,410.60	1,426.60	1,398.00	1,424.80								
3	08/11/2023	1,424.20	1,436.80	1,422.16	1,426.20	1,416.47	1,406.33	1,387.87	1,377.73	1,434.93	1,445.07	1,463.53	
4	09/11/2023	1,435.60	1,437.13	1,414.00	1,415.40	1,428.39	1,419.97	1,413.75	1,405.33	1,434.61	1,443.03	1,449.25	Possibly down
5	10/11/2023	1,412.80	1,425.40	1,388.60	1,398.40	1,422.18	1,407.22	1,399.05	1,384.09	1,430.35	1,445.31	1,453.48	Likely down
6	13/11/2023	1,408.40	1,416.60	1,401.00	1,407.20	1,404.13	1,382.87	1,367.33	1,346.07	1,419.67	1,440.93	1,456.47	
7	14/11/2023	1,409.80	1,418.00	1,381.85	1,383.40	1,408.27	1,399.93	1,392.67	1,384.33	1,415.53	1,423.87	1,431.13	Definitely down
8	15/11/2023	1,387.20	1,401.40	1,378.20	1,392.80	1,394.42	1,370.84	1,358.27	1,334.69	1,406.98	1,430.56	1,443.13	
9	16/11/2023	1,379.60	1,397.40	1,371.40	1,382.00	1,390.80	1,380.20	1,367.60	1,357.00	1,403.40	1,414.00	1,426.60	
10	17/11/2023	1,389.00	1,410.60	1,376.20	1,410.60	1,383.60	1,369.80	1,357.60	1,343.80	1,395.80	1,409.60	1,421.80	Likely up
11	20/11/2023	1410.2	1419.8	1384.4	1408	1,399.13	1,387.67	1,364.73	1,353.27	1,422.07	1,433.53	1,456.47	

Fig 9. The current assessment of a turning point

As we can see the trend might be changing on the 17th of November. On that day we were given an indication that it is likely to go up. We do not know what actually happened as at the time of writing this paper this was the last date available.

However, we should take a look at the last 180 trading days, for example. The GSK stock moved as depicted on the left-hand side of Fig 10.



Fig 10. GSK stock movements between 7 March 2023 and 20 November 2023 with the turning points identified using the classic analysts' approach

I ran the method described here to see how successfully the turning points have been identified, and I got a lot of them (see the right-hand side of Fig 10). Every vertical line represents a turning point identified using the method described above.

My take was that this might be a good method if you are trying to track your stocks on a daily basis, but for any longer-term analysis, you just get too many signals. Too many up-and-down flags, so in the end you are not sure if you really hit the turning point or if this was just a regular up-and-down movement that stocks normally follow.

I am not saying that the approach has no value, but I was not sure that it actually identifies a turning point in stock and share movements. It is more of a short-term window into what is probably happening with the stocks on a daily basis.

As we can see the chartists' and analysts' approach is reasonably logical, but lacks rigour, requires a certain amount of interpretation and produces too many confusing signals. Perhaps it is impossible to find a method that is 100% accurate, but this should not stop us from trying.

I decided to wrestle with this problem, and the paper that follows offers an alternative approach. This alternative approach is based on statistics, which I believe addresses the need to predict a turning point much more accurately and reliably.

In addition, the alternative approach, as will be clear from this next paper, also offers the ability to modulate the sensitivity of the method. Somewhere around Fig 3 in this paper, we stated that the turning point is dependent on how deeply we zoom into the data. This means that it would be useful to change the sensitivity of the method and treat differently shorter from longer time series. Check the paper entitled “How to predict a turning point for stocks and shares – An alternative approach”.

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