Treat each transaction as separate, with its own principal, its own gain, and its own number of days. Then the total annualized return is just a weighted average of each annualized return, with the weighting related to the number of shares in that transaction.

Compound annual growth rate (CAGR) of a single investment of one or more shares bought at price *Po* and sold at price *Pn* after *t* years:

purchase price

value at time *t* time held (years)

Growth of a portfolio comprised of *n* purchases, with the *i*th purchase being for *m* shares:

shares bought in purchase

return on purchase

number of purchases

Problem: calculated portfolio growth can be positive, despite losing money

Ex: 2 purchases, one for $100 and one for $10, both sold for $50, one after 1 year and one after 0.5 years. Spent $110, received $100. Calculated return: +1175%.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Shares bought | Purchase price ($) | Sale price ($) | Time held (y) | Return (%) | CAGR (%) |
| 1 | 100 | 50 | 1 | -50 | -50 |
| 1 | 10 | 50 | 0.5 | 400 | 2400 |

Previously, I was calculating portfolio compound annual growth rate (CAGR) of a portfolio as

investment of one or more shares bought at price *Po* and sold at price *Pn* after *t* years:

purchase price

value at time *t* time held (years)

Calculate annual rate of return

Calculate annual rate of return

[Calculate annualized return on stock with multiple transactions](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions)

[Ask Question](https://money.stackexchange.com/questions/ask)

Asked 9 years, 6 months ago

Active [5 months ago](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions?lastactivity)

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1

I understand how to calculate the Annualized return on a stock when I have single purchase ie

(principal + gain/principal) ^ (365/days) - 1

but how is it calculated when I have multiple buys and sells over a time period?

[stocks](https://money.stackexchange.com/questions/tagged/stocks) [rate-of-return](https://money.stackexchange.com/questions/tagged/rate-of-return)

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[edited Nov 2 '10 at 21:06](https://money.stackexchange.com/posts/4326/revisions)

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asked Oct 31 '10 at 22:19

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* Would I simply use the average cost per unit \* current units – [CodeKiwi](https://money.stackexchange.com/users/1845/codekiwi" \o "193 reputation) [Nov 1 '10 at 0:06](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions#comment4081_4326)

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3 Answers

[Active](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions?answertab=active#tab-top)[Oldest](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions?answertab=oldest#tab-top)[Votes](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions?answertab=votes#tab-top)

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Treat each transaction as separate, with its own principal, its own gain, and its own number of days. Then the total annualized return is just a weighted average of each annualized return, with the weighting related to the number of shares in that transaction.

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answered Nov 1 '10 at 3:08

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* Additionally, here is a related post I made which has some helpful links for performing calculations such as these. [money.stackexchange.com/questions/2992/…](http://money.stackexchange.com/questions/2992/comparing-ira-vs-401ks-rate-of-return-with-dollar-cost-averaging) – [CrimsonX](https://money.stackexchange.com/users/553/crimsonx" \o "3,339 reputation) [Nov 1 '10 at 17:43](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions#comment4088_4329)
* Excellent, makes perfect sense. Also this is the best method for me as this will be implemented in code rather than excel (I really should have meantioned this up front, sorry Eric). – [CodeKiwi](https://money.stackexchange.com/users/1845/codekiwi" \o "193 reputation) [Nov 2 '10 at 21:24](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions#comment4109_4329)
* @CodeKiwi - In case you decide you need it, you can implement IRR in code as well, although it's a pretty inefficient algorithm since it's somewhat non-deterministic. Google will give you plenty of code samples. – [Eric Petroelje](https://money.stackexchange.com/users/894/eric-petroelje) [Nov 3 '10 at 13:56](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions#comment4119_4329)

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The best way to do this is to use [IRR](http://en.wikipedia.org/wiki/Internal_rate_of_return). It's a complicated calculation, but will take into account multiple in/out cash flows over time along with "idle periods" where your money may not have been doing anything. Excel can calculate it for you using the [XIRR function](http://www.ehow.com/how_4763654_excel-calculate-investment-portfolio-returns.html)

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answered Nov 1 '10 at 14:31

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* Ha. I was composing this exact reply, as I saw this pop up. You got it Eric, good answer. – [JTP - Apologise to Monica**♦**](https://money.stackexchange.com/users/187/jtp-apologise-to-monica) [Nov 1 '10 at 15:31](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions#comment4087_4333)
* 1

Here's [another answer](http://money.stackexchange.com/questions/2992/comparing-ira-vs-401ks-rate-of-return-with-dollar-cost-averaging/2995#2995) with a sample IRR spreadsheet. – [Alex B](https://money.stackexchange.com/users/815/alex-b) [Nov 2 '10 at 21:08](https://money.stackexchange.com/questions/4326/calculate-annualized-return-on-stock-with-multiple-transactions#comment4107_4333)