HAIG-SIMONS INCOME*

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Abstract

TBD

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1 Capital gains and double counting

The Canberra group's 2001 report[1] on the measurement of income in national accounts raises an important concern about whether the capital gains double count income. They write:

> If the value of a share increases because of the increased performance of the company concerned, the increase in the share will be related to the increase in dividends expected in the coming years. To count both as income would be to count the same income flow in two periods.

This analysis, however, overlooks the fact that paying out dividends reduces the market value of the shares approximately one-to-one with payouts (**?**). This is exactly the reason why stock prices fall on ex-dividend dates. The fact that dividend payments subtract from capital gains ensure there is no double counting of income: any future payout of dividends will be properly subtracted from future Haig-Simons income since shares prices decline on the ex-dividend date.[2]

To see this, consider following numerical example. There is a Lucas Tree that grows 1 fruit per year for five years, and no fruit afterwards. Each fruit will sell (with no uncertainty) for a market price of \$1, and the risk free real interest rate is 0%. Given these assumptions, the no arbitrage price of the tree P_t is \$5, the present discounted value of the fruit dividends. In addition, assuming no other income sources, the Haig-Simons income of whoever owns the tree is *zero* every year, since the real interest rate is 0.[3]

Now assume there is an increase in fruit productivity, such that the tree produces *two* fruits per year. Over the tree's life, a total of 5 additional fruit will be produced, which will engender over the tree's life an increase in consumption of \$5. Does the Haig-Simons concept double count this income?

Haig-Simons income in year 1 equals current dividend income (\$2 from the fruit) plus the change in value of the tree, which increases from 5 at the beginning of the year to 8 at the end of the year. Total Haig-Simons income is thus \$5. In year's 2-3, Haig-Simons income is 0: positive \$2 from fruit dividends, and minus \$2 from a decline in the tree's value. The total Haig-Simons income from increase in fruit productivity over the five years is thus exactly \$5.

2 The secular decline of interest rates

Real interest rates have declined substantially since the 1980s, both in the United States (**?**) and globally (**?**), although they have recovered somewhat since Covid-

[1] **?**.

[2] A similar argument to this was made in **?**.

[3] Haig-Simons income in this case equals dividends + capital gains. Every year the dividend is 1, and the capital gain is -1 since the value of the fruit tree declines ex-dividend date.

Table 1: Haig-Simons Income from Lucas Tree: Base Case vs. Productivity Shock ($r = 0$)

Component	**1**	**2**	**3**	**4**	**5**	**Total**
Panel A: Base Case (1 Fruit/Year)						
Dividends (D_t)	\$1	\$1	\$1	\$1	\$1	\$5
Capital Gains (ΔP_t)	- \$1	- \$1	- \$1	- \$1	- \$1	- \$5
Haig-Simons Income ($D_t + \Delta P_t$)	**\$0**	**\$0**	**\$0**	**\$0**	**\$0**	**\$0**
Panel B: Productivity Shock Case (2 Fruits/Year)						
Dividends (D_t)	\$2	\$2	\$2	\$2	\$2	\$10
Capital Gains (ΔP_t)	+ \$3	- \$2	- \$2	- \$2	- \$2	- \$5
Haig-Simons Income ($D_t + \Delta P_t$)	**\$5**	**\$0**	**\$0**	**\$0**	**\$0**	**\$5**

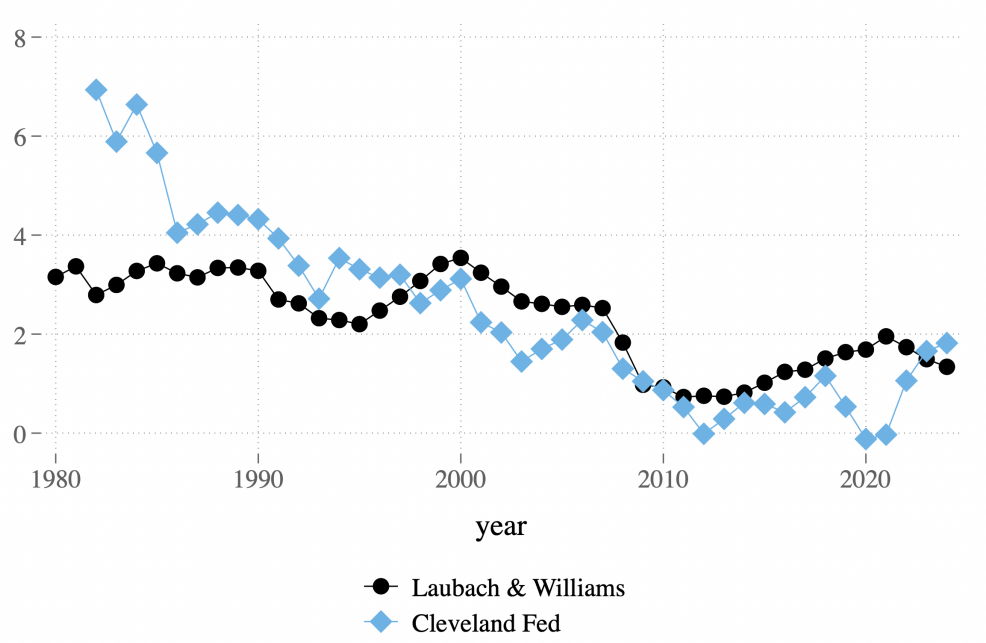
19 (**?**). Lower interest rates generate higher asset prices (and positive capital gains), since future dividends are discounted at lower rates.

Capital gains driven by interest rate changes are potentially problematic to measures of Haig-Simons income that aim to capture changes in welfare, since asset owners are not necessarily better off with lower rates even if their asset values increase. A rentier owning a consul that yields a real income stream of \$100 per annum, who does not plan to sell, is neither better nor worse off if a decline in interest rates increases the security's market value (**??**). Given the well documented secular decline in interest rates, it is open question to what extent the large magnitude of capital gains documented in CRW are due to this factor.

To begin to quantify this magnitude, Figure **??** shows the time series for two measures of real interest rates: the real interest rate on 10-year treasuries, using expected inflation from the Cleveland Fed, and the estimated natural rate of interest from **?**. Both have decline precipitously since the 1980s. We note, however, that the majority of this decline occurred in the 1980s and 1990s, prior to the beginning in our sample period of 2002. From 2002-2021, the 10-year real treasury rate declined by 2.1%, while the natural rate of interest declined by 1.0%.

We quantify the effects of the observed decline in interest rates on capital gains in equity markets through a discounted cash flow model of equity prices, through which declines in interest rates affect equity valuations through lower discount rates on future profits. By feeding in observed changes in interest rates into the valuation model, we can quantify the degree to which they have driven observed changes in valuations.

Figure 1: Real interest rates



Notes: Data from the Cleveland Fed and Laubach & Williams.

We model equity prices of the S&P 500 using a multi-stage free-cash-flow to equity model in the spirit of **?** and Panigirtzoglou and Leoys (2005). Cash flows are defined as dividends plus net share repurchases, and are estimated for the five years using analysts' earnings forecasts from I.B.E.S.

$$P_t(r_t^f) = \sum_{j=1}^{5} \frac{CF_{t+j}}{(1 + r_t^f + ERP_t)^j} + \frac{\text{Terminal Value}_{t+5}}{(1 + r_t^f + ERP_t)^5} \tag{1}$$

To estimate capital gains from interest rate changes, we calculate

$$\text{Interest rate return}_t = \frac{P_t(r_{t+1}^f)}{P_t(r_t^f)} - 1. \tag{2}$$

Table 2 shows the results of this exercise. From 2002-2001, the S&P 500 index grew an average of 1.6% per year due to declines in real interest rates. This growth rate is about one fourth the size of the average revaluation return of 6.14% over the time period. In other words, interest rate changes were responsible for 25% of aggregate capital gains in the stock market. This is similar in magnitude to the estimates of **?**, who estimate that in the US changes in dividends can explain 80% of the rise in capital gains, while discount rate changes explain 20%.

Table 2: Summary of S&P 500 Growth and Revaluation Returns (2002-2021)

Metric	Annual Value	% S&P 500 Growth
Panel A: $\Delta g = \frac{1}{2}\Delta r$		
S&P 500 Real Price Growth	6.14%	100%
Index Interest Rate Growth (C. Fed)	1.58%	26%
Index Interest Rate Growth (L&Ws)	$.77\%$	13%
Panel B: $\Delta g = 0$		
Index Interest Rate Growth (C. Fed)	2.3%	37%
Index Interest Rate Growth (L&Ws)	1.1%	18%

3 Discount rate changes

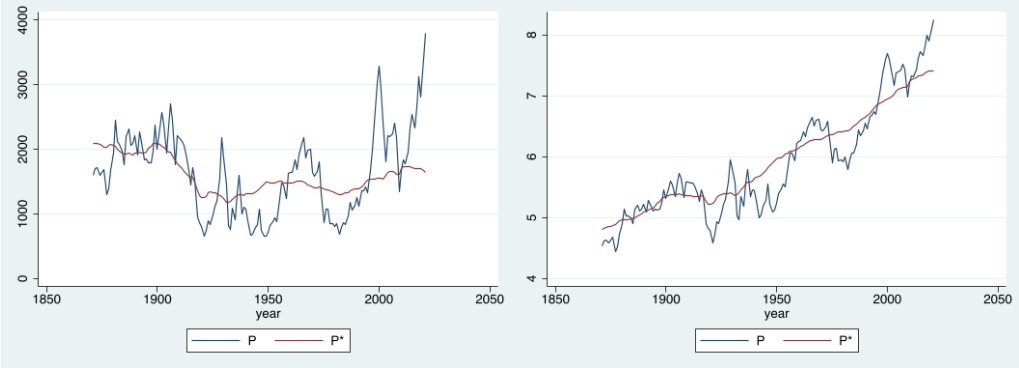
More generally than interest rate changes, asset prices may be driven by variations in *discount rates*, defined as anything that changes the price of an asset without affecting its present or future cash flow. In a series of papers, **?** and **?** show that discount rates affect welfare both through capital gains as well as changing effective future returns. Under a number of strict assumptions[4] the change in welfare from a discount rate change is proportional to the present value of an individual's net asset sales, rather than their capital gains.

If discount rate changes were driving the majority of long-run revaluations, it would be inappropriate to include capital gains as part of an income measure. A historical example that comes close to this extreme case is Norway from 1994-2019. As documented in **?**, the majority of Norwegian wealth is held in real estate and fixed income, with public and private equities comprising only a modest share. Capital gains during the period were driven by a *fourfold* increase in house prices while rents were constant. If individuals did not respond to the increase in house prices to invest in other assets or increase consumption, their change in welfare can be approximated by a net asset sale formula.

Given these theoretical results, it is important to determine the extent to which capital gains in the US driven by discount rate changes versus changes in earnings. The answer to this question in term depends on the time-horizon considered. We will argue that nearly *all* long-run changes in asset values are driven by earnings changes, whereas most short term changes are driven by discount rate variation. Our application in this section will focus on public equity wealth, however similar reasoning can be applied to private business and housing assets.

The argument for the long-run dominance of earnings is straightforward.

[4]Such as: asset price changes are infitesimally small and thus do not affect asset allocations, asset price changes do not relax borrowing constraints, there is no change in the underlying risk of the asset, and wealth does not appear in the utility function.



(a) (b)

Figure 2: Replication of **?** (a) Original detrended series (b) Series with trend added back

Writing stock prices P_t as the P/E ratio times earnings, since P is non-stationary, while P/E is stationary, it must be the case that variation in earnings has driven the long-run increase in P. Figure **??** shows long-run data on stock prices (P) and the present discounted value of earnings (P^*), updating the analysis of **?** to the present day.[5] Figure **??** (b), which uses un-demeaned data, shows that the short and medium deviations of prices from earnings, while significant, pale in comparison to the common trend. Over the entire time period, real prices increased by a factor of 22, driven by an 11 fold increase in earnings and a 2 fold increase in the price to earnings ratio.

Figure **??** (a) replicates the original **?** de-trended data, revealing the familiar excess volatility finding for short and medium term fluctuations: stock prices move around their long-term averages much more than an average of their ex-post realized future earnings, P*.

In their empirical application, **?** are careful to study asset prices demeaned around a constant price to dividend ratio, correctly noting that the finance literature has shown the majority of these short and medium term deviations are due to discount rate changes. Elsewhere, however, they implicitly and explicitly claim that the majority of *all* capital gains, inclusive of long-run changes, are driven by discount rate changes rather than earnings.[6] They cite in support of this assertion the classic results of **?** and **?**, however as noted above these sources use detrended data, and therefore have nothing to say about long-term price changes and discount rates. If anything, their assumption of a stationary P/D ratio supports the notion that all long-run are due to earnings change. Other references cited in support of their argument of long-run discount rate supremacy also lack support. In particular,[7] the citation of **?** is misplaced because this work in fact

[5] In this figure we use earnings, but the results are similar for dividends.

[6] For example, "...discount rate shocks account for most asset-price fluctuations". ""both at high frequencies and over long time horizons".

[7] Footnote 24 of **?**.

shows that 70% of long run changes in stock prices are due to cash flows and only 30% due to discount rate changes. This finding is similar to that of **?**, who finds 80% of the rise of US stock market value is due to earnings, and only 20% due to changes in the discount rate.

When studying inequality, to ignore earnings-driven capital gains by asserting they are merely discount changes is to ignore the largest source of income for the top of the distribution. Nearly all of the members at the Forbes Billionaires list made their fortunes through capital gains versus accumulated labor and capital income. In addition, as shown in **?**, the rise in private business wealth was also driven by capital gains

Online Appendix for
The value of Private Business

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A Capital gains and double counting