SOCIAL WELL BEING THROUGH TECHNOLOGY'S SOBERING EFFECT ON INFLATION

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Purpose of this paper	Normally inflation figures are in the spotlight @ 3% or 4% or 8% as it is compared to the previous year's prices. But real life is not quarter to quarter or this year's quarter to last year's quarter or "this month ,last year" comparison .The actual inflation which is dangerously seeping into the economy has to be compared with the benchmark rate for a given period and then seen whether we are facing the monstrous threat of "hidden inflation"
Keywords	Benchmark inflation, Continuous series inflation, saturated sectors, unsaturated sectors, sector's technology level, Reverse calculation of inflation.
Design/methodology /approach	Reverse calculation of inflation index to arrive at the first base year and thus arrive at the continuous series..
Findings	Higher the level of technology of a sector, more the CAGR of the Investment → Production → Sales → Returns (vigorous cycle). Thus higher the sobering effect on inflation.
Research limitations	Actual cycle may differ at the Industry level. Only sector level study has been undertaken
Practical implications	Giving a boost to technology sector may have a restraining effect on the high rate of "seeping inflation" that has entered the economy.
Social Implications	Fruits of a growing economy with controlled inflation will lead to social well being in the long run.

What is original/value of paper	Completely original

I.Introduction

Social well-being and prices are deeply connected for human beings across the world. Low prices in general spurs consumption and thus a growing economy and the result is social well-being. High prices in general are a deterrent for consumption, retards the economy and thus results in social unhappiness.

"Keeping prices under control" has been the buzzword for all our successive governments right from Independence. How successful we have been can be understood by the movement of CPI (AL and IW) and WPI throughout these years for which data is available.

But after studying these movements how can one decide how much rise in prices is "high" i.e how much "high" is high. The accepted benchmark is that a 4% year-on-year inflation is something which is not only acceptable but desirable. Secondly a change in the Base year does not give us the true picture of the underlying inflation so I have additionally converted the series back to the first base year and called it "Continuous" series. Lastly I have compared this continuous series with the "Benchmark" series of 4%. This comparison gives us a clear appreciation of the "Biting Inflation" which is one of the major causes of social misery.

Following is the data taken from RBI archives (RBI, 2017) which portrays this disturbing fact.CC = continuous series.

S.No	Year	CC 3 BY 2004-05 = 100	CC 2 BY 1994 -95 = 100	CC 1 BY 1981-82 = 100	CPI - AC Inflation Index Base Year 1970-71 = 100	Benchmark Inflation @ 4%, y-o-y basis
1	2	3	4	5	6	7
1	1970-71				100.00	100.00
2	1971-72				105.60	104.00
3	1972-73				116.20	108.16
4	1973-74				139.70	112.486
5	1974-75				174.90	116.986
6	1975-76				173.00	121.665
7	1976-77				176.60	126.532
8	1977-78				185.80	131.593
9	1978-79				185.80	136.857
10	1979-80				217.60	142.331
11	1980-81				257.30	148.024

12	1981-82			= 100	281.30	153.945
13	1982-83			104.90	295.084	160.103
14	1983-84			112.80	317.306	166.507
15	1984-85			120.10	337.841	173.168
16	1985-86			125.40	352.75	180.094
17	1986-87			132.70	373.285	187.298
18	1987-88			143.50	403.666	194.79
19	1988-89			154.20	433.765	202.582
20	1989-90			165.70	466.114	210.685
21	1990-91			182.70	513.935	219.112
22	1991-92			207.80	584.541	227.877
23	1992-93			228.70	643.333	236.992
24	1993-94		= 100	247.80	697.061	246.472
25	1994-95		112.60	279.023	784.891	256.33
26	1995-96		121.60	301.325	847.627	266.584
27	1996-97		127.20	315.202	886.662	277.247
28	1997-98		132.80	329.078	925.698	288.337
29	1998-99		140.70	348.655	980.765	299.87
30	1999-00		145.30	360.053	1012.83	311.865
31	2000-01		155.70	385.825	1085.32	324.34
32	2001-02		161.30	399.701	1124.36	337.313
33	2002-03		166.80	413.33	1162.70	350.806
34	2003-04		175.90	435.88	1226.13	364.838
35	2004-05	=100	187.30	464.129	1305.60	379.432
36	2005-06	104.5	195.729	485.015	1364.35	394.609
37	2006-07	111.4	208.652	517.04	1454.43	410.393
38	2007-08	116.6	218.392	541.175	1522.32	426.809
39	2008-09	126.0	235.998	584.803	1645.05	443.881
40	2009-10	130.8	244.988	607.081	1707.72	461.637
41	2010-11	143.3 Announced inflation	268.401	665.097	1870.92	480.102

The color will help in identifying the continuous series masked by the change in the base year. If we tie up the index to the base year 1970-71 the continuous series in column 6 has a figure of 1870.92. In layman's terms if one ton of onion was costing Rs 100/- in 1970 is costing Rs 1870/- in 2010-11. Now if the benchmark inflation @ 4% is applied to a hypothetical series for the same period with the same base year of 1970-71 as 100 we get the series in column 7. This means that the same ton of onion "should" cost Rs 480/- and not Rs 1870/-!!!

If we look at technological advancement over these forty one years and also extend this analysis right upto the present period there has been a sea change in life. But these advancements have been a source of controlling for inflation in their own market domains.

II.Sobering Effect of Technology – The Smartphone.

Let us look at the ubiquitous smart phone. It has revolutionized the entire gamut of human activities. Some of the industries severely affected and about to become extinct or had to restructure themselves to adopt this technology are…

1. Landline phones (almost extinct).
2. Real Estate (Between commercial realty and residential realty, commercial demand has been subdued all through these years).
3. Printing and publishing industry.
4. Wrist watches (era of digital watches/smart watches)
5. Torch Industry.
6. Banking sector.
7. Education sector.
8. Health sector.
9. Courier industry.
10. India post.
11. Financial Investments services.
12. Radio, Tape recorders (already extinct).
13. Retail Industry.
14. Entertainment (OTT is replacing old fashioned theatres)
15. Video conferencing (and as a result travel industry. Commercial travels are shrinking)
16. Payment services.
17. Food ordering. (Restaurants are experiencing online orders as compared to footfalls).

There can be many more sectors/industries which are, if not directly affected , have faced an indirect effect on their turnovers.

III.ROI Cycle

Technologies sobering effect on inflation can be understood by the following Investment → Production → Sales → Returns diagram also known as the ROI cycle in short.(This terminology is given by me).

The more vigorous the above cycle lesser the inflation in the long run. Also higher the absolute monetary values segregated over an industry more the economies of scale and thus lesser the inflation.

Moreover each stage, at the macro level, can be either inflation inducing , inflation reducing or inflation neutral effect on the economy. Let us discuss on it.

III.a - Investment - Total (Incremental) Asset . This is the first and fundamental stage for any economy. Higher the incremental assets invested each year higher or lower would be the inflation depending on the sectoral saturation level. When there is no saturation, investment (read inflation) will have a tonic effect on output and employment. This may be all the more true when inflation is unanticipated and wages lag behind prices because prices rise at a faster rate than the money wage rates and the resulting reduction in real wages gives businesses the profit incentive to hire more workers and expand output.(Icfai University Press, 2004).

When there is saturation, incremental investment will automatically tend to be zero or even disinvestment again the effect will be inflationary as prices will certainly rise at a faster rate than the money wage rates.

III.b - Production – Total Expenses. The effect will be as above, the only difference is in the magnitude of the effect. If production is in a saturated sector price cuts can be anticipated thus lessening inflation and if it is in a sector having scope of expansion it will be increasing that form of inflation which will have a tonic effect.

III. c - Sales – Total Income. Revenue for the producer is expense for the consumer. Inflation is what the consumer is spending and not what the producer is selling. For a product/service in a saturated sector prices will be low and so the inflation. For an unsaturated sector prices will be high (The AS-AD framework, shift in the AD curve) and so the inflation.

III.d - Returns – PAT and Retained earnings. If profits are high it reflects high inflation and if profits are low or even negative it reflects lesser sectoral inflation because higher lower/negative profits are due lower prices. In other words it was the lower selling prices which have resulted in low/negative profits.

IV. Research Methodology.

I have a database gleaned from CMIE's Prowess consisting of 80 sectors, containing 309 industries which aggregate 6723 companies data spread over 4 to 9 years for each company.

A peek into the depth of the data base can be had from the first page of the table presented below

Sector (1 to 80)	Industry (1 to 309)	Company (1 to 6723)	Count
Auto Ancillaries	Auto Ancillaries - Axles / Shafts	Automotive Axles	11
		Axles India	10
		GNA Axles	9
		Hindustan Hardy	11
		Rane (Madras)	11
		Talbros Engg.	11
	Auto Ancillaries - Batteries	Amara Raja Batt.	11
		Exide Inds.	11
	Auto Ancillaries - Brakes	Amtek Auto	10
		ANG Inds	9
		Sundaram Clayton	11
Automobile	Automobiles - LCVs/HCVs	Ashok Leyland	11
		Force Motors	11
		SML ISUZU	11
		Tata Motors	11
	Automobiles - Motorcycles / Mopeds	Eicher Motors	10
		Hero Motocorp	11
		TVS Motor Co.	11

The complete table depicting all the 6723 companies runs into 178 pages long.

For this study the sectors are further segregated into five levels based on their dependency on technology .

The levels are 1. None 2. Low 3. Medium 4. High 5. Very High

The assumption is higher the technology level of a sector, more vigorous the above cycle and lesser the resultant inflation in the economy.

The list of sectors and their corresponding technology level are given below

1. Technology Level – None

S.No	Sector	Count

1	Alcoholic Beverages	273
2	Bearings	47
3	Castings, Forgings & Fastners	651
4	Cement	446
5	Cement - Products	100
6	Ceramic Products	154
7	Crude Oil & Natural Gas	89
8	Diamond, Gems and Jewellery	562
9	Diversified	178
10	Dry cells	44
11	Edible Oil	634
12	Ferro Alloys	3
13	Fertilizers	332
14	Leather	270
15	Mining & Mineral products	591
16	Miscellaneous	2801
17	Non Ferrous Metals	513
18	Oil Drill/Allied	65
19	Paints/Varnish	99
20	Paper	724
21	Petrochemicals	213
22	Pharmaceuticals	1970
23	Plantation & Plantation Products	921
24	Plastic products	1047
25	Readymade Garments/ Apparells	209
26	Refineries	83
27	Refractories	103
28	Sanitaryware	11
29	Steel	1907
30	Sugar	470
31	Tobacco Products	76
32	Tyres	150

2. Technology level – Low

S.No	Sector	Count
1	Agro Chemicals	256
2	Auto Ancillaries	1281
3	Capital Goods-Non Electrical Equipment	1548
4	Chemicals	2150
5	Construction	1528
6	Consumer Durables	764
7	Gas Distribution	77

8	Hotels & Restaurants	733
9	Infrastructure Developers & Operators	450
10	Packaging	861
11	Power Infrastructure	6
12	Printing & Stationery	64
13	Real Estate Investment Trusts	3
14	Realty	1740
15	Textiles	4321
16	Trading	4744

3. Technology level – Medium

S.No	Sector	Count
1	Air Transport Service	81
2	Automobile	185
3	Banks	415
4	Cables	357
5	Capital Goods - Electrical Equipment	902
6	Credit Rating Agencies	32
7	Education	153
8	Entertainment	1006
9	FMCG	1373
10	Healthcare	457
11	Marine Port & Services	10
12	Power Generation & Distribution	435
13	Ship Building	122
14	Shipping	114

5. Technology level - High

S.No	Sector	Count
1	Computer Education	126
2	Electronics	82
3	Engineering	308
4	Finance	9323
5	Insurance	55
6	Logistics	498
7	Media - Print/Television/Radio	287
8	Stock/ Commodity Brokers	335

6. Technology level – Very High

S.No	Sector	Count

1	E-Commerce/App based Aggregator	44
2	IT - Hardware	221
3	IT - Software	2831
4	Online Media	11
5	Telecom-Handsets/Mobile	22
6	Telecomm Equipment & Infra Services	244
7	Telecomm-Service	147

I have taken the mean value for each sector from the five technology levels. Thus the sectors selected from each level and their counts are given below

S.No	Technology Level	Sector	Count
1	None	Castings, Forgings & Fastners	651
2	Very Low	Hotels & Restaurants	733
3	Low	Agro Chemicals	256
4	Medium	Entertainment	1006
5	High	Logistics	498
6	Very High	IT - Software	2831

The variable which have been taken for comparison are

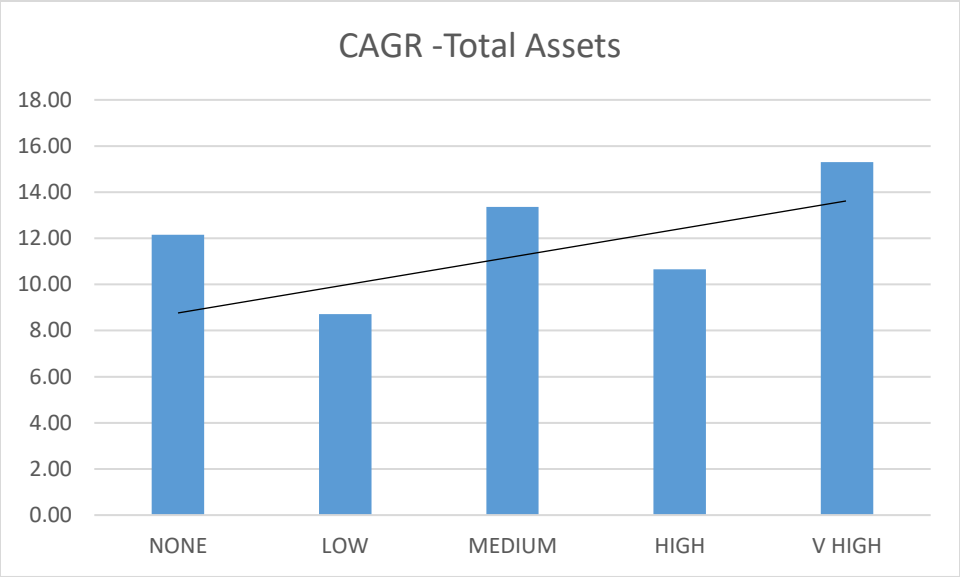
1. Total Assets (for Investments)
2. Total expenses (for production)
3. Total Income (for Sales)
4. PAT (for net income)
5. Retained earnings (for Savings)

The number of years over which data is available ranges from 2009 to 2019.

V. Data Analysis and Output.

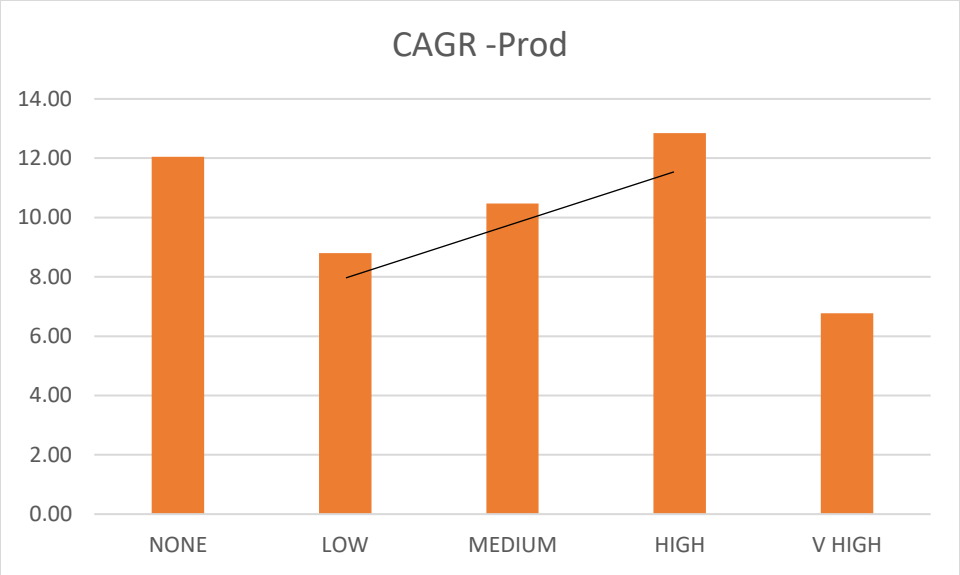
S.No	Tech Level	CAGR - TA	CAGR - Prod	CAGR - Sales	CAGR - PAT
1	NONE	12.16	12.05	12.40	11.94
2	LOW	8.71	8.80	9.13	4.62
3	MEDIUM	13.37	10.47	10.90	4.22
4	HIGH	10.66	12.85	12.57	12.47
5	V HIGH	15.30	6.77	6.57	-205.16

V.a - Compounded Annual Growth Rate for Total assets technology level wise.



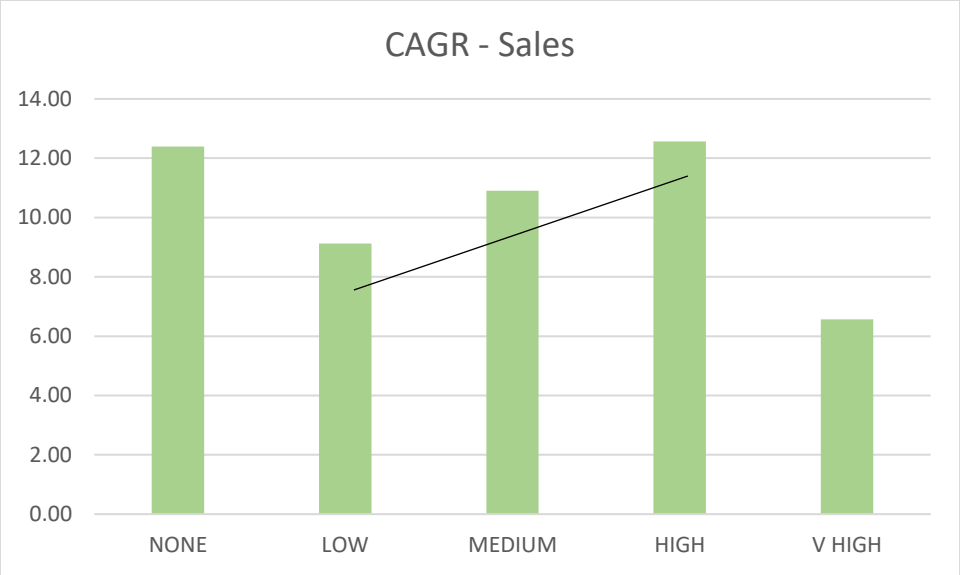
Interpretation - As far as the first step of the Investment (TA) → Production → Sales → PAT cycle there is a clear increase in the Median CAGR from None Tech level to V.High Tech level. As explained in III a above, higher the total asset invested higher the inflation ,but moderated by the sector's saturation level. Now high technology sectors are not saturated when investment is concerned. So Investment will not increase inflation but instead will have a tonic effect (read deflationary effect) on the economy (especially in the long run).

V.b - Compounded Annual Growth Rate for Production Expenses technology level wise.



Interpretation - The second step in the cycle is production which clearly shows an increasing trend in the middle tech levels. (Low-Medium-High).Here again, as explained in III.b above, (for the low-medium-high continuum) production expenses are increasing albeit in the sector having "scope of expansion" will increase that inflation which will have a tonic effect. For the "Very High" technology level production expenses are fundamentally low reflecting lesser (expected selling) prices for the consumer and hence lower inflation.

V.c - Compounded Annual Growth Rate for Sales and Revenue technology level wise.



Interpretation - Median CAGR for Sales also display the same increasing trends (for the Low-Medium-High continuum). Rising sales revenue is a sign of buoyant sector and thus a buoyant economy. As far as prices (and inflation) are concerned those firms following demand based pricing policy will hike up their prices thus resulting in inflation and will decrease their prices during low demand conditions and thus reducing inflation. Again those firms following cost based prices will not vary their prices due to rising or falling demand. So a rising sales revenue for such firms is actual buoyant demand and thus a rising economy and eventually subdued inflation.

Very high tech sector has not kept pace with the increasing sales can be because of the following permutation and combination resulting in four quadrants as explained below

We all are aware that Sales (Amount) = Quantity x Selling Price. If sales are high it can either Quantity sold is high or selling prices are high or both are high. Similarly if sales are low the reason can be either due to low quantity sold or low selling price or both. Final sales is a function of quantity and selling price which can be further understood as below.

PRICE		Quantity			PRICE
		Low	High		

	High	Quadrant 1 - LQHP High price will stoke inflation, coupled with low quantity if due to limited supply will certainly lead to high inflation.	Quadrant 2 - HQHP High price will stoke inflation but as quantity is also high this will lead to tonic effect of inflation.	High	
	Low	Quadrant 4 - LQLP Low prices will lead to subdued inflation, coupled with low quantity will not have overriding effect on the economy.	Quadrant 3 – HQLP Low price will lead to subdued inflation and coupled with high quantity will have a super tonic effect on the economy.	Low	
		Low	High		
		Quantity			

V.d Compounded Annual Growth Rate for Sales and Revenue technology level wise.

Very High technology sector has experienced negative profits as shown below.

This clearly shows that high technology level sectors have had a sobering effect on inflation (Quadrant 3…). If the prices were high this sector could have resulted in high profits instead.

VI . Findings, Recommendations and Conclusion.

Findings : As hypothesized in II above when business sectors are categorized based on technology levels the sectors with a high level have a sobering effect on inflation by way of combining utilities (17 have been listed) thereby reducing costs and also through each stage of the ROI cycle (III a ,b ,c and d).

Recommendations – Innovation helps in reducing inflation and thus leads to social well-being. It is imperative that Policy makers should provide a conducive atmosphere for research and modernization. This leads to avoiding saturation in sectors and propelling growth and overall social, commercial and cultural welfare.

Conclusion – Another avenue for new business opportunities lies in Electric vehicles which has to be implemented on a war footing. Problem of lithium ion batteries can be sorted out (ypte.org.uk) by proper research for reducing the side effects of producing electric cars and batteries.

References

1.rbi.org (for CPI and WPI data).

2. Macroeconomics – The Icfai University Press, February 2004. (For inflation theory).

3. ROI cycle is introduced by the author.

4. ypte.org.