Attractiveness in Semiconductors

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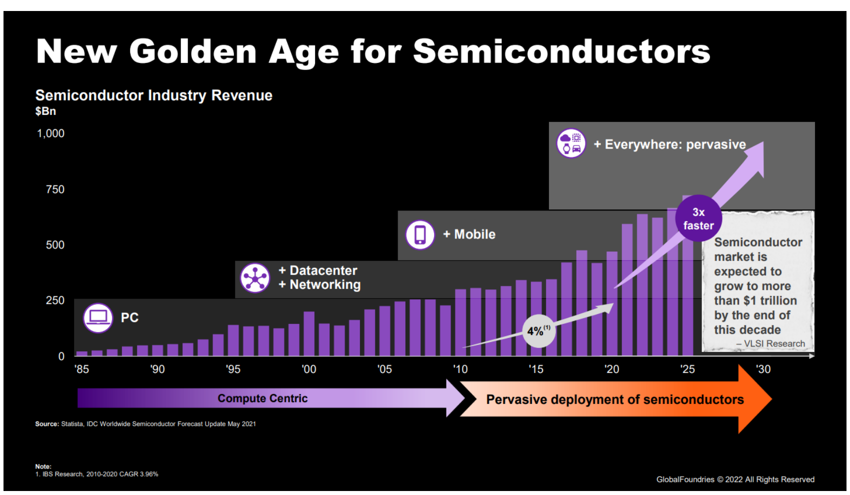
Over the next decade, the global semiconductor industry is positioned for rapid growth driven by higher adoption of 5G, electric vehicles, artificial intelligence/deep learning, data centers, memory and storage, networking, security, cloud computing, and the internet of things. A semiconductor chip, also known as an integrated circuit, typically made of silicon, is used in many electrical applications that we use daily. According to the World Semiconductor Trade Statistics (WSTS), the increase in the consumption of electronic components and overall chip demand accelerated post pandemic with the industry growing revenues by 9% in 2020, 26% in 2021, and poised to reach over $600 billion, or 4% by 2022.

Organizations such as Gartner, Inc., a technological research and consulting firm, and World Semiconductor Trade Statistics ("WSTS"), a research and forecast source for the semiconductor industry, expect global semiconductor revenue to decline 3-4% decline in 2023 due to weakness in consumer-driven segments (white goods/smartphones, memory) offset by growth in enterprise segments (industrial, automotive, analog, sensors, logic). While the semiconductor industry is cyclical, as we outline below, the long-term demand and supply fundamentals are positive. We are taking the opportunity in 2023 to position client investment portfolios for what we expect will be a decade of projected strong growth given the critical nature of chips to the global economy.

Table 1. Semiconductor Revenue Forecast, Worldwide, 2021-2023 (Billions of U.S. Dollars)

	2021	2022	2023
Revenue	595	618	596
Growth (%)	26.3	4.0	-3.6

Source: Gartner (November 2022)



Supply and Demand

On the demand side, usage is pervasive; semiconductors are used in a variety of electronic applications, from televisions, defense and aerospace systems, healthcare equipment, smartphones, computers, automobilities, and data centers. While digital consumption is becoming more prevalent, there is also rising demand and cost for raw material content per unit, such as silicon, as digital products require increasingly more material each year.

Semi content per unit	2015	2020	2025F	
HIGH END SMARTPHONE	$100	$170	$275	+62%
AUTO (GLOBAL AVERAGE)	$310	$460	$690	+50%
DATACENTER SERVER (CPU + ACCELERATOR)	$1,620	$2,810	$5,600	+99%
SMARTHOME (GLOBAL AVERAGE)	$2	$4	$9	

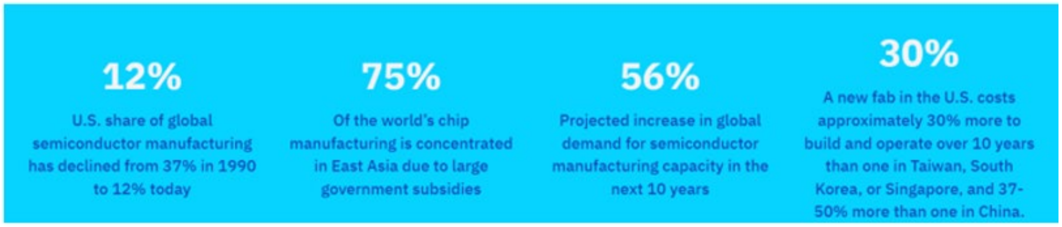
SILICON CONTENT GROWING AS EVERYTHING GETS SMARTER

Reference: Applied Materials

On the supply side, the industry has been facing challenges. Globally, existing fabrication facilities are operating at full capacity. Long research and development and building cycles for new fabrication facilities have led to delays in new expansion. Additionally, upfront capital costs can be significant while skilled labour shortages and increased node design complexity present ongoing challenges. Supply chains for semiconductor production are global; different regions have different product capabilities, such as assembly, testing, design, fabrication, intellectual property, and automation. When one region shuts down (due to geopolitical issues, capacity constraints, Covid19) the entire semiconductor production process is interrupted, which has been the experience over the last few years. On a positive note, semiconductor companies and original equipment manufacturers have started to rebuild capacity and supply-chain issues are slowly moderating.

Manufacturing Localization

Today, 75% of global chip manufacturing is from East Asia; however, restrictive trade agreements have led governments to reconsider their reliance on foreign manufacturers and to bring chip production back to the United States. The Biden Administration recently introduced the CHIP ACT for "Creating Helpful Incentives to Produce Semiconductors and Science Act of 2022." The legislation provides over $50 Billion in subsidies for domestic chip production over the next 5-years and provides a 25% investment tax credit for chip production plants. Semiconductor companies with US fabrication capacity and companies that produce machinery or equipment for chipmakers will benefit (see more below).



Source: SIA: Semiconductor Industry Association

Investing and Sector Profitability

There are different business models across the value-chain in the semiconductor industry including integrated devices manufacturers, designers which sell semiconductor chips, foundries which operate semiconductor fabrication plants, and semiconductor equipment suppliers. BCV Asset Management ("BCV") sees good opportunities in Applied Material, Inc. (AMAT), Analog Devices, Inc. (ADI), and Texas Instruments Incorporated (TXN), as these companies will benefit from the structural changes the industry is experiencing.

Looking at financials, the sector has displayed above-average profitability over the last 5 years compared to other sectors in the stock market in addition to outperforming US stock market benchmarks (S&P500) over the last 10 years. For example, semiconductors had total average annual returns of 23% per year compared to the S&P500 of 13%. At BCV, while we acknowledge that we do not know the events that will transpire in the short term, we continue to see attractive long-term opportunities in the semiconductor space.

iShares Semiconductor ETF (SOXX)

Profitability (%) | Valuation (x) | Coverage (x) | Leverage

Profitability (%)

	5Y Avg
Gross Margin	50.36
Operating Margin	24.92
Net Margin	21.00
EBIT Margin	24.92
EBITDA Margin	36.46
Return on Assets	11.23
Return on Equity	22.15
Return on Invested Capital	14.48
Free Cash Flow Margin	22.70

Reference: FactSet

iShares Semiconductor ETF (SOXX) $349.33

Comparable Returns

	Price Change (%)		Total Return (%)		NAV Total Return (%)	
	Cum	Ann (CGR)	Cum	Ann (CGR)	Cum	Ann (CGR)
iShares Semiconductor ETF	582.92	21.16	672.16	22.66	643.85	22.21
S&P 500	169.76	10.42	227.14	12.57	--	--

Reference: FactSet

Central Banks are not Yield Curves

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Throughout 2022, media outlets have bombarded their audiences with click-bait headlines whenever the Bank of Canada ("BoC"), or the Federal Reserve in the United States, announce a monetary policy update.

"*Bank of Canada Raises Interest Rates Again*" or "*Rates Expected to Rise Next Week After Meeting*" are examples or recent headlines.

What these articles often don't explain is that they are referring to the BoC's monetary policy rate. Rate, not rates – just one. There is a common misconception that when the BoC increases or decreases its policy rate, the entire risk-free yield curve moves in tandem. The risk-free yield curve being the line formed when Government of Canada treasury bills and bonds (considered risk-free) are plotted by yield and maturity (see chart below).

(Source: Bloomberg LP)

The BoC's policy rate *only influences short-term interest rates* (approximately 2 years to maturity and under). All other terms are driven by market expectations of economic growth, inflation, bond supply and demand dynamics, and other factors. However, rising interest rates across the entirety of the yield curve throughout 2022, while central banks were increasing their respective policy rate, served to reinforce the misconception that they alone were to blame for the painful year for fixed income assets and investing. This fallacy can be illustrated by what the bond market thinks of the BoC's rate hikes and "tough talk", which is to say that since March 2022, the market has largely refused to believe that the BoC's projected terminal policy rate would have much staying power. In fact, as of December 2022, based on implied yields, the bond market is pricing another 25 basis point *hike* early this year, before a 25 basis point *cut* by the end of 2023 (i.e., a potential pivot, not just pause, this calendar year).

Region: Canada » Instrument: Overnight Index Swaps »

Target Rate 4.250 Pricing Date 12/30/2022

Effective Rate 4.2800 Cur. Imp. O/N Rate 4.256

Meeting	#Hikes/Cuts	%Hike/Cut	Imp. Rate Δ	Implied Rate	A.R.M.
01/25/2023	+0.736	+73.6%	+0.184	4.440	0.250
03/08/2023	+0.948	+21.2%	+0.237	4.493	0.250
04/12/2023	+1.247	+29.9%	+0.312	4.567	0.250
06/07/2023	+1.485	+23.8%	+0.371	4.627	0.250
07/12/2023	+1.218	-26.6%	+0.305	4.560	0.250
09/06/2023	+1.095	-12.4%	+0.274	4.529	0.250
10/25/2023	-0.309	-140.3%	-0.077	4.179	0.250
12/06/2023	+0.027	+33.6%	+0.007	4.263	0.250

(Source: Bloomberg LP)

If the BoC's next projected hike occurs, look further out along the yield curve before concerns arise about your good-quality corporate bond with 5+ years to maturity. Similarly, when the inevitable headlines confirming central bank pausing (and potentially pivot) occurs, an automatic boost to the prices of your longer-term bonds is not guaranteed.

Understanding that sovereign risk-free yield curves are dynamic, historically very predictive, and only modestly influenced by monetary policy rates is important. Paying more attention to the evolving shape of the yield curve, the path and rate of change in rates, yield volatility, etc. throughout 2022, and less to the perfectly manicured statements from unelected central bank officials, would have provided more context to the softening economic data that we're now seeing (that actually began this past spring if you looked close enough) and the multiple bear-market rallies in the capital market since the start of 2022. While the yield curve at the end of 2021 was, by historical standards, quite flat, it became completely horizontal by March 2022 (excluding short-term yields) – this move towards inversion (a downward sloping curve with shorter-term yields above longer-term yields) was a warning sign. Indeed, the U.S. and Canadian yield curves both began to modestly invert by June 2022, along with the Eurodollar futures curve (a strong predictor of financial market dollar liquidity, and a bellwether for financial market well-being), with full inversion by September. Even the almighty and historically stable German bund curve is now inverted in a somewhat unprecedented fashion.

The purpose of this note is not to discuss the current macroeconomics and geopolitics, that by this point, we're all aware is causing these notable yield curves. Instead, we'd like to bring focus to the rate of change and path of sovereign yield curves. It was the move towards inversion that was the canary in the coalmine this past spring. Similarly, <u>gradual moves towards curve normalization (i.e., a return to an upward slope) should be monitored as a sign of improving financial market tone</u>. Central banks are not yield curves, and it pays to look beyond their limited sphere of influence.

Over the last decade, fixed income yields were challenged to provide positive real returns. Now, however, good quality corporate bonds can provide 5-7% over a 5–10-year period – not a bad return, even with the potential for inflation to settle meaningfully above pre-pandemic levels.

So now, with the yield curve now fully inverted, and most major Canadian banks calling for some form of recession, it is difficult to assess if equity markets priced in a sufficient downturn. Historically, while the yield curve is inverted, and particularly when central banks are still in their tightening cycles, equity markets tend not to bottom. Economic data may have further room to surprise to the downside, including labour data (which is a notoriously lagging indicator). *However, it is very difficult to time exact equity market turnarounds.* Instead, here at BCV, we trust the process. Portfolio Managers of separately managed accounts actively reinvest dividends, interest, and bond maturities, and have discretion when reviewing portfolio allocations. Remember that a portfolio's fixed income allocation is there to provide stable income (which it now actually does) and act as a source of capital to take advantage of any meaningful decline in equities.

BCV's Online Client Portal - SideDrawer

Dale Hawthorn, CPA, CA

President & Chief Operating Officer

BCV is now offering clients the opportunity to access their client statements and other pertinent information electronically on our new client portal hosted by SideDrawer. If you have received an onboarding email directly from SideDrawer, please use that email to setup your access to the platform. If you have misplaced your onboarding email from SideDrawer or somehow did not receive one, please use the following steps to get your access:

1. Visit http://bcv.sidedrawer.com.
2. Enter your email address. The email used for your access configuration is the one provided to BCV during our initial information gathering process in signing up as a client with BCV. If you do not know which email address to use, please contact SideDrawer support at support@sidedrawer.com.
3. You will then be asked to create a password. Please do so in accordance with the requirements noted.
4. Save the link in #1 above to reference in the future when accessing your information.

If you have more than one set of statements (for example: a personal and corporate set of statements), both will be accessible on the right-hand side of the dashboard (they appear as circles that can be clicked on which brings you to the details for that entity).

If you have any questions or require further assistance, please contact SideDrawer support at support@sidedrawer.com.

If this is your first time receiving a BCV quarterly statement (ie: you are a new client to BCV within this quarterly reporting period), you may not yet be set up. However, please know that we are working to have this access provided to you as soon as possible and be on the look out for your welcome email from SideDrawer.

Thank you for your continued trust and support and we look forward to enhancing your experience with BCV.