

(Virus) Wave Theory

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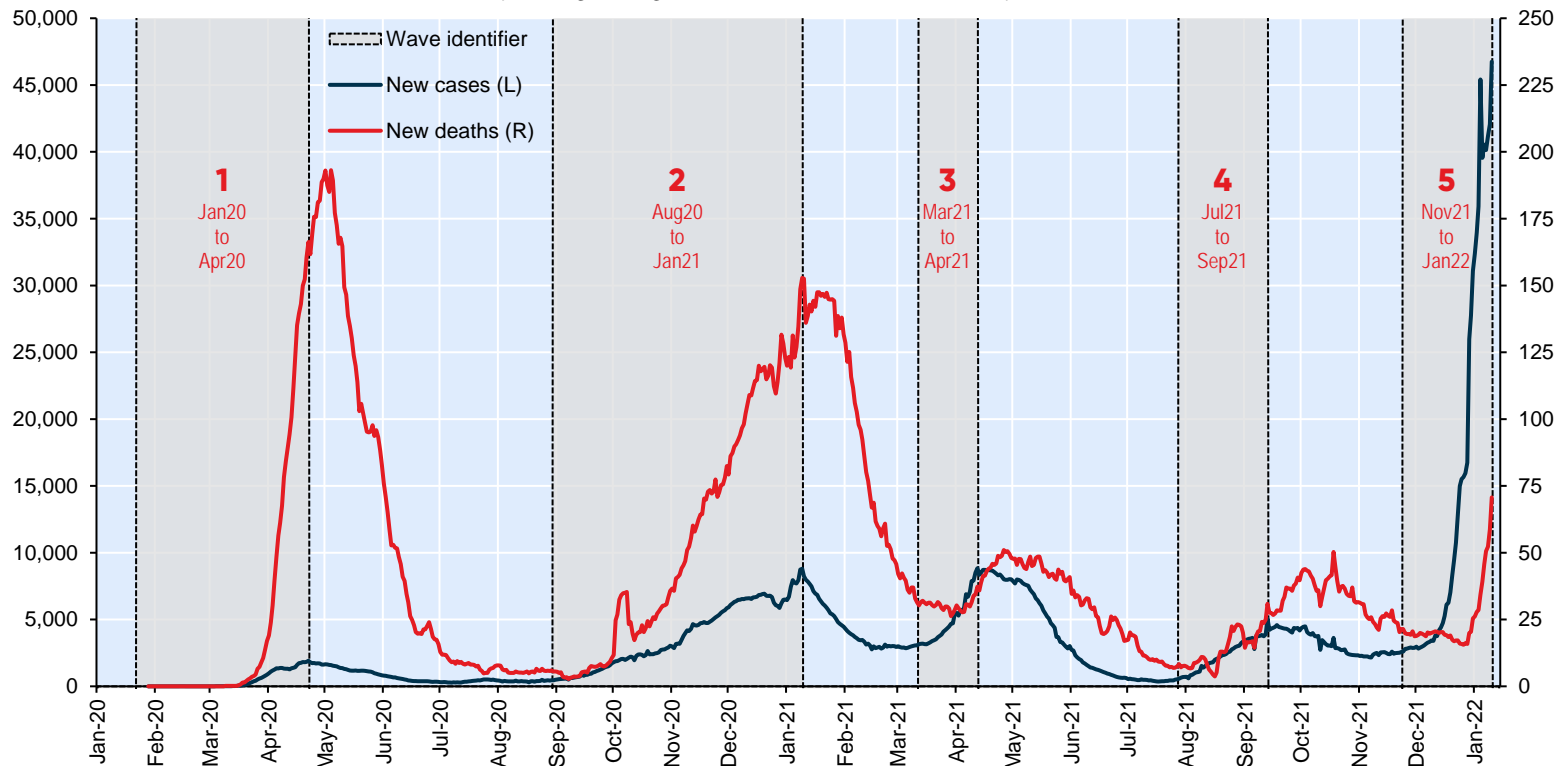
First, a necessary concession: We're not physicists. That means our knowledge of 'wave theory', as it relates to the movement of light, is rather limited. Nor are we medical professionals. And there's simply not enough praise one can extend to the health care professionals working tirelessly to contain the pandemic, here at home and all across the globe.

But as economists/strategists, we know a little something about pattern identification. So here, we've reflected on how Canada's economy and financial markets have coped with successive waves of the virus. We call this Virus Wave Theory and have included a collection of charts and tables (along with some ultra-brief commentary) to highlight undulations in everything from rates, currencies, credit and equities.

Please note that our more detailed thinking on this latest wave, and its direct implications for the real economy and financial markets, is spelled out in our collection of January Monthly Monitors, dropping this week.

Chart 1: Five virus waves have crashed over Canada's economy, with the infection rate in latest wave unlike the rest

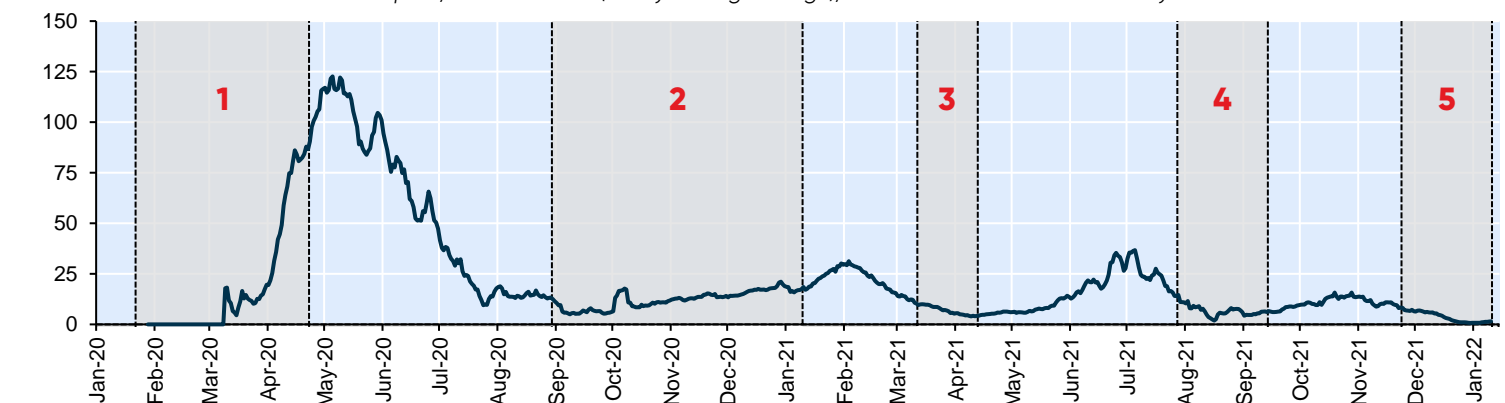
Canada COVID-19 new cases & new deaths (7-day moving average), with five virus waves identified by NBF



Source: NBF, JHU CSSE | Note Based on 7-day moving average, Canada recorded 46,750 new cases on 10-Jan-2022, a new record & provisional peak for wave 5 (subject to change)

Chart 2: Omicron has spread incredibly fast, although lethality of this now-dominant strain relatively contained

Canada ratio of COVID-19 new deaths per 1,000 new cases (7-day moving average), with five virus waves identified by NBF



Source: NBF, JHU CSSE | Note: This chart scales deaths to cases; e.g., as at 10-Jan-22, new deaths averaged ~71 over latest 7D, while new cases averaged >46K over latest 7D, with the corresponding ratio of 1.5 comparing to an average of 22 since Canada's first virus-related death was recorded in Mar-20; waves refer to new cases, as opposed to new deaths

Table 1: Virus wave dating... the evolution of COVID-19 cases/deaths across Canada's five distinct waves

Canada COVID-19 new cases & new deaths: From initial wave 1 (Jan-20 to Apr-20) to latest wave 5 (Nov-21 to Jan-22)

Canada: Virus wave dates							Start to Peak (days)	The below values measure the change observed in the weeks leading up to the PEAK new case count for each wave.				The below values measure the change observed in the weeks after the PEAK new case count for each wave.				
Wave	START	PEAK	P+7D	P+14D	P+28D	P+56D	Peak (days)	Chg: Leading up to Peak (#)				Change: After Peak (#)				
1	Wed 22-Jan-20	Wed 22-Apr-20	Wed 29-Apr-20	Wed 6-May-20	Wed 20-May-20	Wed 17-Jun-20	91	1,917	1,916	1,495	542	478	-285	-397	-748	-1,523
2	Sun 30-Aug-20	Sat 9-Jan-21	Sat 16-Jan-21	Sat 23-Jan-21	Sat 6-Feb-21	Sat 6-Mar-21	132	8,344	4,244	2,193	2,720	2,093	-1,848	-3,099	-5,099	-5,908
3	Fri 12-Mar-21	Mon 12-Apr-21	Mon 19-Apr-21	Mon 26-Apr-21	Mon 10-May-21	Mon 7-Jun-21	31	5,667	6,066	5,674	4,151	2,934	-155	-821	-1,603	-7,038
4	Wed 28-Jul-21	Mon 13-Sep-21	Mon 20-Sep-21	Mon 27-Sep-21	Mon 11-Oct-21	Mon 8-Nov-21	47	4,492	4,678	3,075	1,819	2,271	-654	-698	-2,330	-2,690
5	Wed 24-Nov-21	Mon 10-Jan-22	Mon 17-Jan-22	Mon 24-Jan-22	Mon 7-Feb-22	Mon 7-Mar-22	47	44,157	44,252	42,566	30,803	10,822	NA	NA	NA	NA

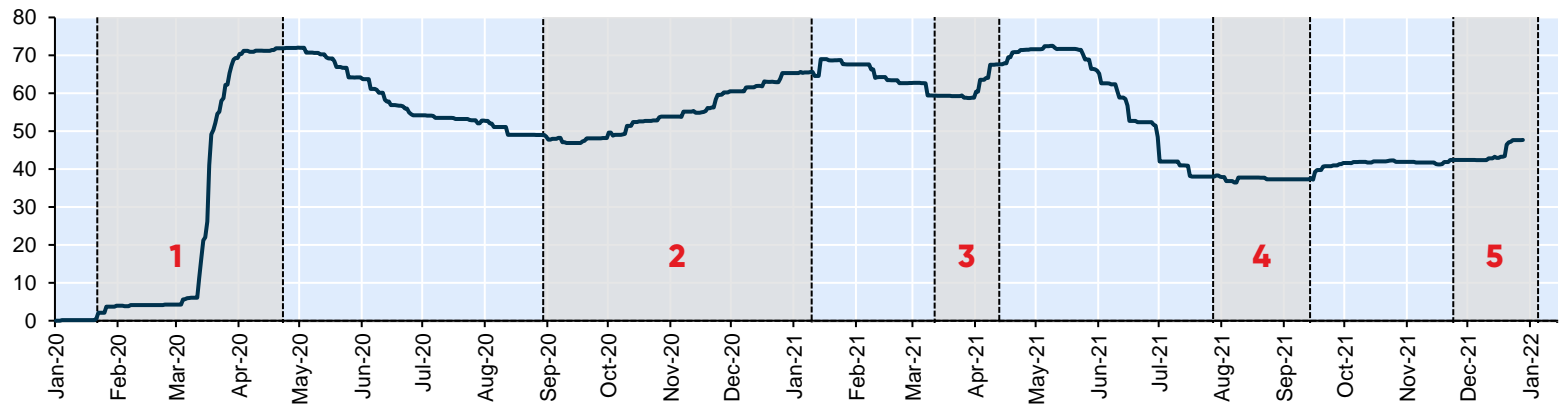
Canada: New cases/day (7D avg)							Chg: Start to Peak (#)	Chg: Leading up to Peak (#)				Change: After Peak (#)			
Wave	START	PEAK	P+7D	P+14D	P+28D	P+56D	Peak (#)	P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D
1	0	1,917	1,631	1,520	1,169	394	1,917	1,916	1,495	542	478	-285	-397	-748	-1,523
2	450	8,794	6,945	5,694	3,695	2,885	8,344	4,244	2,193	2,720	2,093	-1,848	-3,099	-5,099	-5,908
3	3,165	8,832	8,677	8,011	7,228	1,794	5,667	6,066	5,674	4,151	2,934	-155	-821	-1,603	-7,038
4	570	5,062	4,409	4,364	2,732	2,372	4,492	4,678	3,075	1,819	2,271	-654	-698	-2,330	-2,690
5	2,594	46,750	TBD	TBD	TBD	TBD	44,157	44,252	42,566	30,803	10,822	NA	NA	NA	NA

Canada: New deaths/day (7D avg)							Chg: Start to Peak (#)	Chg: Leading up to Peak (#)				Change: After Peak (#)			
Wave	START	PEAK	P+7D	P+14D	P+28D	P+56D	Peak (#)	P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D
1	0	166	189	177	106	23	166	166	162	99	42	22	11	-61	-143
2	6	153	142	145	106	36	147	93	44	43	30	-11	-8	-47	-117
3	30	37	44	51	49	31	7	-30	6	11	9	7	14	11	-7
4	8	31	28	38	30	24	23	22	27	8	16	-3	7	-1	-7
5	21	71	TBD	TBD	TBD	TBD	49	43	51	55	42	NA	NA	NA	NA

Source: NBF, JHU CSSE | Note: Unofficial wave dates identified by NBF based on observed change in cases; peak refers to maximum change in new cases (based on 7D moving average); for latest wave (i.e., 5th), a provisional peak of 46,750 average daily new cases was observed on 10-Jan-22, although the situation remains fluid with peak subject to change

Chart 3: Tracking government restrictions in response to successive waves of the virus

Bank of Canada COVID-19 stringency index for Canada (0 to 100)

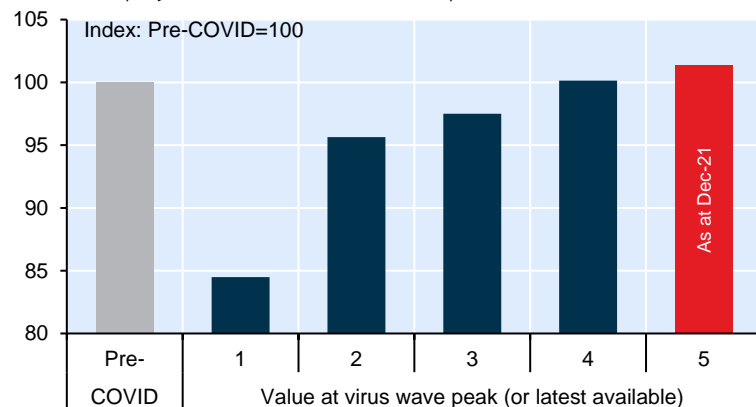


Source: NBF, JHU CSSE, BoC | Note: Latest data point as at 28-Dec-21; refer to BoC for additional details on stringency index ([link](#))

The rapid spread of omicron has led to fresh restrictions across Canada, even if the full extent of sanitary measures has yet to be reflected in the BoC's COVID-19 stringency index. Restrictions will temporarily sacrifice jobs and growth, keying a sizeable haircut to Q1 GDP in particular. But as restrictions ease, a strong rebound starting in Q2 could leave the end-of-year level of GDP unchanged.

Chart 4: The not-so-long march back to full employment

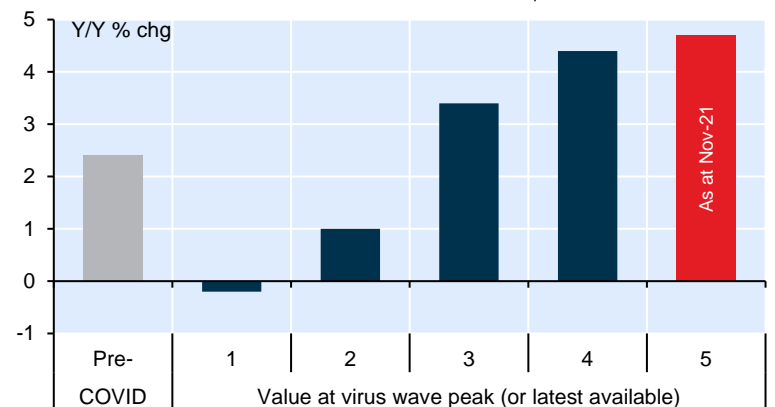
Canada employment: Pre-COVID vs. level at peak of each wave



Source: NBF, JHU CSSE, StatCan | Note: Jan-21 LFS could produce net job losses

Chart 5: Canadian inflation stepped up and up and up

Canada all items CPI inflation: Pre-COVID vs. level at peak of each wave

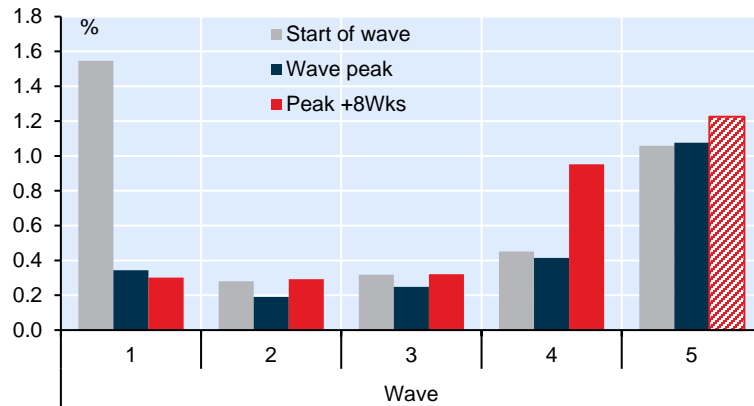


Source: NBF, JHU CSSE, StatCan | Note: Jan-21 CPI will be released 16-Feb-22

As per the above comment, don't be surprised if January's Labour Force Survey ushers in job losses in response to fresh restrictions. Still, Canada had effectively returned to (really surpassed) full employment by the end of 2021. Meanwhile, inflation has moved further above the BoC's target band. Despite a Q1 GDP hit, inflation might average nearly 4% for 2022 as a whole. Steamy stuff.

Chart 6: Rate normalization coming, in spite of sickness

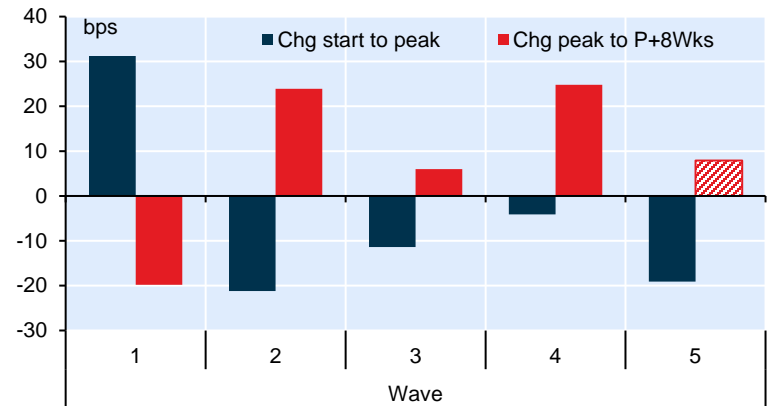
GoC 2Y yield: Start of each virus wave to post-peak



Source: NBF, JHU CSSE, Bloomberg | Note: Wave 5 P+8W level is NBF forecast

Chart 7: For yield differentials, first wave was the real outlier

GoC-UST 10Y yield differential: Change during each wave & following peak

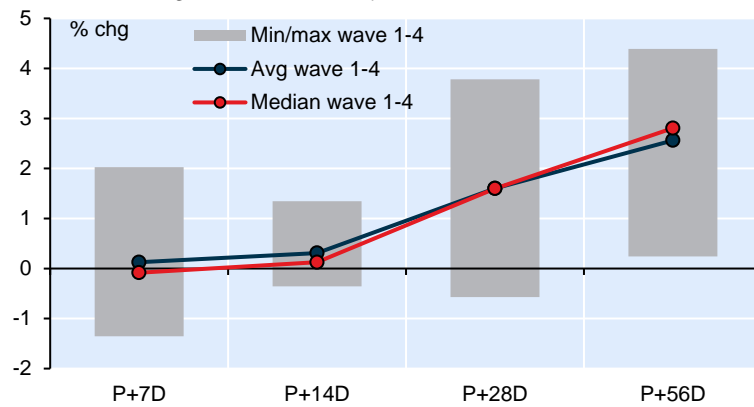


Source: NBF, JHU CSSE, Bloomberg | Note: Wave 5 P+8W level is NBF forecast

As prior waves of COVID gathered steam, anxiety grew, risk sentiment wavered and yields compressed. As expected, the optimism spurred by declining case counts keyed a subsequent sell-off in rates. As it stands, with inflation running well above target and labour markets essentially healed, this 5th wave is not expected to derail the rate normalization train. Indeed, a slowing in case counts will likely coincide with an accelerated sell-off. Similarly, prior COVID waves in Canada have been characterized by rate outperformance vs. the U.S. as infections climbed (save for wave 1 during peak market chaos). As case counts fell, Canada underperformance followed—a trend we see playing out again in coming weeks, with the BoC looking to outgun the FOMC on rate hikes in 2022.

Chart 8: CAD has tended to regain strength after peak

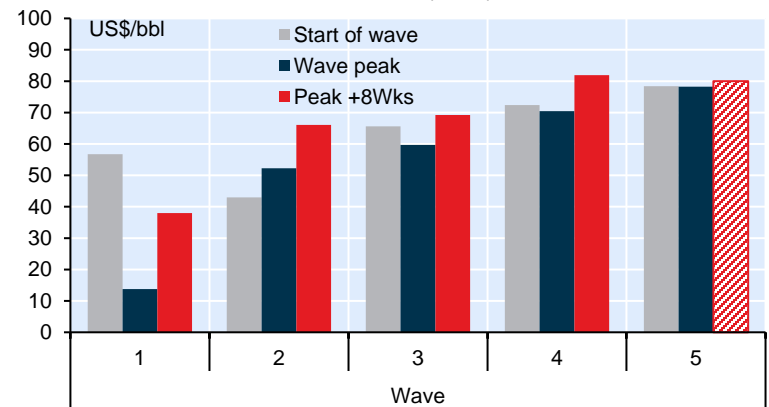
Cumulative change in CADUSD after peak case count: Waves 1-4



Source: NBF, JHU CSSE, Bloomberg | Note: Wave 5 excluded as peak only just established

Chart 9: Loonie benefited from post-peak oil pop in past

Crude oil (WTI): Start of each virus wave to post-peak

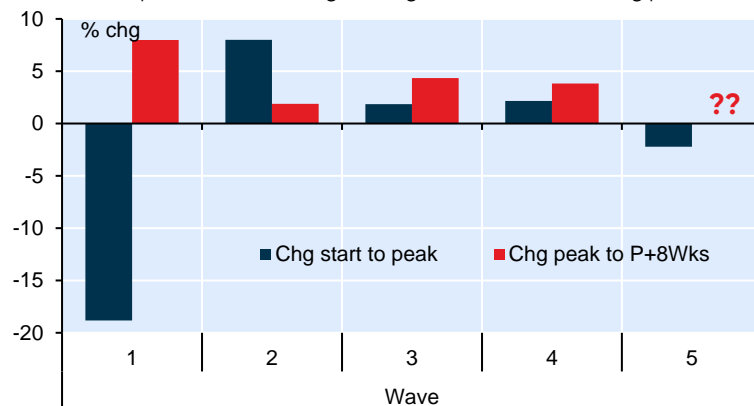


Source: NBF, JHU CSSE, Bloomberg | Note: Wave 5 P+8W level is NBF illustration

The virus has left a mark on the loonie, the C\$ losing ground during 3 of the first 4 waves. But the currency was generally 1.5-3% stronger in the handful of weeks after cases peaked. We ultimately see the omicron impact on the C\$ proving short-lived. The loonie will draw support (among other things) from elevated commodity prices, as we highlighted in both [FOREX](#) and a recent [Hot Chart](#).

Chart 10: Stocks have weathered recent waves well

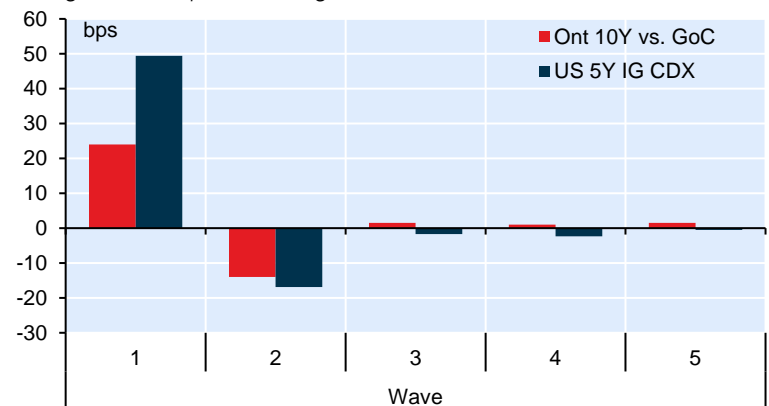
S&P TSX Composite Index: Change during each wave & following peak



Source: NBF, JHU CSSE, Bloomberg | Note: Refer to [Monthly Equity Monitor](#) for equity call

Chart 11: Credit increasingly indifferent to epidemiology?

Change in credit spreads during each wave



Source: NBF, JHU CSSE, Bloomberg

Be it equities or credit, the initial arrival of the virus clearly upset the apple cart. But thanks to an historic stimulus effort (both fiscal and monetary), successive waves have proven increasingly manageable for both equity and credit markets. The S&P TSX may be off slightly since the 5th wave really got rolling, but we remain constructive on (and outright overweight) Canadian equities. Canada's high-grade public sector credit spreads have weathered the omicron wave well, 10Y Ontario spreads just 3 bps wider than pre-omicron levels. Consistent with our equity overweight, we're near-term constructive on spreads, although monetary policy normalization and QT (in the form of BoC balance sheet run-off) could generate headwinds as the year progresses.

Table 2: Financial market perspective on Canada's virus waves
Select financial market indicators during COVID-19 waves: From initial wave 1 (Jan-20 to Apr-20) to latest wave 5 (Nov-21 to Jan-22)

		Canada: Virus wave dates						Start to Peak (days)	The below values measure the change observed in the weeks leading up to the PEAK new case count for each wave.				The below values measure the change observed in the weeks after the PEAK new case count for each wave.				
		START	PEAK	P+7D	P+14D	P+28D	P+56D		Chg: Leading up to Peak (bps)				Change: After Peak (bps)				
									P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D	
Virus waves	Wave 1	Wed 22-Jan-20	Wed 22-Apr-20	Wed 29-Apr-20	Wed 6-May-20	Wed 20-May-20	Wed 17-Jun-20	91									
	Wave 2	Sun 30-Aug-20	Sat 9-Jan-21	Sat 16-Jan-21	Sat 23-Jan-21	Sat 6-Feb-21	Sat 6-Mar-21	132									
	Wave 3	Fri 12-Mar-21	Mon 12-Apr-21	Mon 19-Apr-21	Mon 26-Apr-21	Mon 10-May-21	Mon 7-Jun-21	31									
	Wave 4	Wed 28-Jul-21	Mon 13-Sep-21	Mon 20-Sep-21	Mon 27-Sep-21	Mon 11-Oct-21	Mon 8-Nov-21	47									
	Wave 5	Wed 24-Nov-21	Mon 10-Jan-22	Mon 17-Jan-22	Mon 24-Jan-22	Mon 7-Feb-22	Mon 7-Mar-22	47									
CAD OIS			Canada 3M OIS, %						Chg: Start to Peak (bps)	Chg: Leading up to Peak (bps)				Change: After Peak (bps)			
			START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D
	Wave 1		1.710	0.209	0.200	0.201	0.206	0.236	-150.1	-142.8	-10.5	0.7	4.0	-0.9	-0.8	-0.3	2.7
	Wave 2		0.237	0.180	0.178	0.180	0.200	0.213	-5.7	-4.2	-3.0	-1.9	-1.3	-0.2	0.0	2.0	3.3
	Wave 3		0.210	0.193	0.180	0.191	0.189	0.200	-1.7	-1.3	-1.9	-1.3	0.0	-1.3	-0.2	-0.4	0.7
Wave 4		0.194	0.209	0.195	0.203	0.201	0.216	1.5	1.7	1.4	1.1	0.4	-1.4	-0.6	-0.8	0.7	
Wave 5		0.229	0.331	TBD	TBD	TBD	TBD	10.2	8.9	9.7	2.0	3.6	NA	NA	NA	NA	
Rates / Yield differentials			GoC 2Y yield, %						Chg: Start to Peak (bps)	Chg: Leading up to Peak (bps)				Change: After Peak (bps)			
			START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D
	Wave 1		1.55	0.34	0.32	0.32	0.31	0.30	-120.2	-97.9	-28.8	-9.5	0.5	-2.1	-2.9	-3.6	-4.3
	Wave 2		0.28	0.19	0.16	0.19	0.20	0.29	-9.0	-8.2	-6.3	-3.1	-1.1	-3.5	0.0	0.9	10.2
	Wave 3		0.32	0.25	0.30	0.32	0.29	0.32	-7.0	5.5	-6.4	2.1	0.5	5.6	7.6	4.6	7.3
Wave 4		0.45	0.41	0.45	0.51	0.69	0.95	-3.7	-5.7	-2.3	-1.3	1.8	3.3	9.3	27.2	53.8	
Wave 5		1.06	1.08	TBD	TBD	TBD	TBD	1.8	6.7	15.6	9.3	12.5	NA	NA	NA	NA	
		GoC 10Y yield, %						Chg: Start to Peak (bps)	Chg: Leading up to Peak (bps)				Change: After Peak (bps)				
		START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D	
Wave 1		1.45	0.62	0.57	0.61	0.56	0.54	-83.7	-60.2	-28.6	-19.7	-2.6	-5.0	-0.3	-5.5	-8.0	
Wave 2		0.63	0.81	0.81	0.85	1.00	1.50	18.1	8.6	10.2	9.3	13.7	-0.6	3.2	18.6	69.0	
Wave 3		1.59	1.51	1.56	1.53	1.52	1.48	-7.3	48.5	-2.7	-2.2	-4.3	4.2	1.5	0.2	-3.7	
Wave 4		1.17	1.22	1.23	1.41	1.63	1.63	5.2	7.6	5.5	3.6	3.1	0.7	19.1	40.6	41.0	
Wave 5		1.78	1.71	TBD	TBD	TBD	TBD	-6.8	-1.1	31.8	24.9	28.7	NA	NA	NA	NA	
		GoC-UST 10Y yield differential, %						Chg: Start to Peak (bps)	Chg: Leading up to Peak (bps)				Change: After Peak (bps)				
		START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D	
Wave 1		-0.32	-0.01	-0.06	-0.09	-0.12	-0.20	31.2	11.6	-3.6	-4.5	-1.5	-5.8	-8.6	-11.5	-19.8	
Wave 2		-0.09	-0.31	-0.28	-0.24	-0.17	-0.07	-21.2	-13.3	-11.7	-9.8	-6.4	2.8	6.2	13.8	23.9	
Wave 3		-0.04	-0.16	-0.05	-0.04	-0.09	-0.10	-11.4	2.9	-8.9	2.1	-0.8	10.3	11.6	6.7	6.0	
Wave 4		-0.07	-0.11	-0.09	-0.08	0.01	0.14	-4.1	-6.1	-0.6	-0.9	2.8	2.2	3.1	12.0	24.8	
Wave 5		0.14	-0.05	TBD	TBD	TBD	TBD	-19.1	-15.5	-2.5	-3.2	15.6	NA	NA	NA	NA	
Currencies			Canadian dollar vs. U.S. dollar (CADUSD)						Chg: Start to Peak (%)	Chg: Leading up to Peak (%)				Change: After Peak (%)			
			START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D
	Wave 1		0.761	0.706	0.721	0.707	0.719	0.737	-7.2	-5.8	0.2	-1.1	-0.3	2.0	0.1	1.9	4.4
	Wave 2		0.763	0.788	0.785	0.785	0.784	0.790	3.2	3.5	0.7	1.4	0.3	-0.4	-0.4	-0.6	0.2
	Wave 3		0.802	0.796	0.798	0.807	0.826	0.828	-0.7	0.6	-0.7	0.2	-0.3	0.2	1.3	3.8	4.0
Wave 4		0.799	0.791	0.780	0.792	0.801	0.804	-1.0	0.8	-0.6	-0.3	-0.9	-1.4	0.2	1.3	1.6	
Wave 5		0.789	0.789	TBD	TBD	TBD	TBD	-0.1	-1.3	1.1	0.9	0.5	NA	NA	NA	NA	
Commodities			Crude oil: WTI (US\$/bbl)						Chg: Start to Peak (%)	Chg: Leading up to Peak (%)				Change: After Peak (%)			
			START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D
	Wave 1		56.7	13.8	15.1	24.0	33.5	38.0	-75.7	-71.7	-43.7	-45.1	-30.6	9.3	74.1	143.0	175.5
	Wave 2		43.0	52.2	52.4	52.3	56.9	66.1	21.6	30.2	12.2	8.3	7.7	0.2	0.1	8.8	26.5
	Wave 3		65.6	59.7	63.4	61.9	64.9	69.2	-9.0	0.4	-8.7	-3.0	1.8	6.2	3.7	8.7	16.0
Wave 4		72.4	70.5	70.3	75.5	80.5	81.9	-2.7	6.1	4.7	1.8	45.2	-0.2	7.1	14.3	16.3	
Wave 5		78.4	78.2	TBD	TBD	TBD	TBD	-0.2	-3.3	9.7	3.5	2.8	NA	NA	NA	NA	
Credit / Equities			S&P TSX Composite Index						Chg: Start to Peak (%)	Chg: Leading up to Peak (%)				Change: After Peak (%)			
			START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D
	Wave 1		17,600	14,288	15,228	14,831	14,998	15,429	-18.8	-16.2	8.7	2.6	2.4	6.6	3.8	5.0	8.0
	Wave 2		16,706	18,042	17,909	17,846	18,136	18,381	8.0	8.2	2.8	2.4	3.5	-0.7	-1.1	0.5	1.9
	Wave 3		18,851	19,201	19,204	19,171	19,362	20,035	1.9	4.0	1.3	2.6	0.9	0.0	-0.2	0.8	4.3
Wave 4		20,230	20,666	20,155	20,463	20,416	21,456	2.2	4.8	0.9	0.3	-0.7	-2.5	-1.0	-1.2	3.8	
Wave 5		21,548	21,072	TBD	TBD	TBD	TBD	-2.2	-2.8	1.6	-0.7	-0.7	NA	NA	NA	NA	
		Province of Ontario 10Y spread vs. GoC (bps)						Chg: Start to Peak (bps)	Chg: Leading up to Peak (bps)				Change: After Peak (bps)				
		START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D	
Wave 1		63.0	87.0	91.0	84.0	88.5	82.0	24.0	18.5	-27.5	-31.5	-21.5	4.0	-3.0	1.5	-5.0	
Wave 2		73.0	59.0	60.0	60.0	60.0	63.0	-14.0	-11.5	-10.5	-7.0	-5.5	1.0	1.0	1.0	4.0	
Wave 3		63.0	64.5	64.0	63.5	63.0	59.0	1.5	4.5	3.5	-2.5	-1.0	-0.5	-1.0	-1.5	-5.5	
Wave 4		61.5	62.5	64.5	61.0	60.0	58.5	1.0	1.5	2.0	-0.5	1.0	2.0	-1.5	-2.5	-4.0	
Wave 5		60.5	62.0	TBD	TBD	TBD	TBD	1.5	2.5	-1.5	0.0	-0.5	NA	NA	NA	NA	
		U.S. 5Y IG CDX (bps)						Chg: Start to Peak (bps)	Chg: Leading up to Peak (bps)				Change: After Peak (bps)				
		START	PEAK	P+7D	P+14D	P+28D	P+56D		P-56D	P-28D	P-14D	P-7D	P+7D	P+14D	P+28D	P+56D	
Wave 1		45.1	94.5	86.9	93.2	84.0	71.4	49.4	36.8	-8.7	-10.4	7.1	-7.6	-1.3	-10.5	-23.0	
Wave 2		66.5	49.7	52.0	51.1	50.8	53.6	-16.9	-4.8	-4.2	-4.3	-0.2	2.3	1.4	1.2	4.0	
Wave 3		52.7	51.0	50.7	51.1	51.9	50.4	-1.7	0.6	-0.6	-5.2	-0.3	-0.3	0.2	0.9	-0.6	
Wave 4		49.1	46.7	53.7	50.9	53.9	49.5	-2.3	-5.6	-2.1	0.5	-3.2	7.0	4.2	7.2	2.8	
Wave 5		53.0	52.5	TBD	TBD	TBD	TBD	-0.5	1.7	-1.0	3.7	3.0	NA	NA	NA	NA	

Source: NBF, JHU CSSE | Note: Unofficial wave dates identified by NBF based on observed change in cases; peak refers to maximum change in new cases (based on 7D moving average); for latest wave (i.e., 5th), a provisional peak of 46,750 average daily new cases was observed on 10-Jan-22, although the situation remains fluid with peak subject to change

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