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Market Commentary
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The Ukraine War : Strategic Overview

As expected the advent of Ukraine's mud season has resulted in static front lines with continuing bombardment of Ukraine's cities. In such circumstances it is difficult to judge the relative strength of the two contestants. One estimate is that Russia's original invasion force has lost a crippling 10% of its combat power.

There is no estimate of how badly the Ukrainian forces have been damaged by the conflict, but it is likely proportionate. Battlefield defeat of the Russians, originally not considered as a possibility, now appears as a possible albeit not yet a likely outcome. Other scenarios include defeat of the Ukranian forces followed by long partisan warfare or an inconclusive ceasefire in which both sides prepare for renewed conflict. Both Putin's government and the Ukrainian people are currently approaching the conflict as a battle to the death of one or the other contestants.

Battlefield Losses

In an effort to gain some insight, we analyzed data collected by the Dutch website Oryx. This website estimates equipment losses of the two sides based on photos of damaged equipment posted to social media. As not all lost equipment is photographed their estimates are conservative. Their data is probably also biased in favor of whichever side retains control of the battlefield. Still, we can learn much from this data (summarized in table 1.) In one month of combat Russian losses are consistent with 6,000 dead and $5 billion in equipment lost These figures amount to 3.5% of engaged Russian troops and 20% of annual procurement for the Russian military. Note that total casualties would normally run about three times those killed in action, so a reasonable estimate is 18,000 or 10% of those initially committed to battle. This is fairly intense combat and sustainable at this rate only for a few months. For instance, when the Soviets withdrew from Afghanistan after 10 years of occupation their total battlefield deaths were reported as 9,500. Russian troop losses are running at about 5x Ukrainian losses. This is somewhat above the norm of 3.5x which would be considered usual in an infantry assault. However, the figure for material losses is substantially worse. Because the Ukrainians are capturing much Russian equipment intact and redeploying it to their forces, their net material losses are about one tenth that experienced by the Russians. Russia cannot win at such exchange ratios. In the air the Russians are doing substantially better. Their loss of warplanes is only 50% above Ukrainian losses. This loss rate is easily sustainable for the Russians, while the Ukrainians have lost about half their air assets. At sea both sides have lost a major naval vessel. In addition the Ukrainians have lost numerous small vessels and their naval forces no longer presents a threat to the Russians. Unfortunately for the Russians, the decisive theater of operations is on land and the leverage they gain from their air and sea superiority is limited. It is also likely that Russia's indiscriminate bombing of civilians will cause the NATO countries to overcome their qualms and pour more sophisticated air defense systems into Ukraine. If this occurs, the Russian advantage in the air could be lost. Similarly Russia's artillery bombardment will likely be degraded by supply of counter battery systems. Both sides are deploying mainly ex-Soviet equipment. Most of this equipment dates to the late Brezhnev years although some equipment is of even older vintage. In the ensuing half century the NATO countries have had ample time to perfect countermeasures. In particular the US Javelin and UK NLAW systems are proving deadly to Russian armor. These weapons are $100,000 missile systems operated by a single foot soldier which can destroy a $3 million dollar tank crewed by three men from a distance of 1.5 miles. This is as decisive an advantage as Stinger missiles earlier demonstrated against attack helicopters in Afghanistan. Normally tanks and helicopters are the elements which create mobility on the battlefield. With these elements neutralized by NATO weaponry, the battle may develop as static frontal warfare reminiscent of World War 1.

Table 1: Combat Losses

Russian Losses (2/24-3/31,2022)

Category	Type	Units	Cost (M$)	Crew
Infantry Assault	Tanks	355	1,065	483
	Helicopters	38	760	76
	Mechanized Infantry	760	1,193	3,840
Support	Engineering vehicles	68	7	63
	Air Defense Guns	13	180	32
	Air Defense Missiles	41	820	123
Artillery	Field Artillery	85	24	5
	Heavy Artillery	149	189	250
Air Force	Airplanes	17	510	34
	Drones	18	4	
Logiistics	Trains	2	20	10
	Trucks	655	15	762
	Total	**2,201**	**4,787**	**5,678**

Crew losses are estimated on the assumption that units destroyed result in loss of full normal complement of crew, but units captured or abandoned do not result in crew losses.
Costs are replacement costs if new. Actually most Russian equipment losses will be replaced from stored inventory.

Ukrainian Losses, same period

Category	Type	Units Gross	Captured	Net	Cost (M$)	Crew
Infantry Assault	Tanks	86	146	13	39	99
	Helicopters	2	0	2	40	4
	Mechanized Infantry	210	284	68	136	750
Support	Engineering vehicles	9	34	-8	0	4
	Air Defense Guns	3	6	0	0	0
	Air Defense Missiles	33	12	27	540	81
Artillery	Field Artillery	53	60	23	7	0
	Heavy Artillery	29	72	-7	0	72
Air Force	Airplanes	12	0	12	360	24
	Drones	12	6	9	1	0
Logistics	Trains	0	0	0	0	10
	Trucks	205	199	106	3	156
	Total	**654**	**819**	**245**	**1,126**	**1,200**

Net units lost are calculated on assumption half of captured units can be redeployed. Cost is based on net units lost. Crew losses are based on gross units destroyed assuming normal crew complement.

Ratios (Russian/Ukranian)	Units	Cost	Crew
Land	9.7	5.6	4.8
Air	1.5	1.4	1.4

Source: Unit counts from Oryz,com. Unit costs and customary crew are derived from various sources.

Signs of Strain

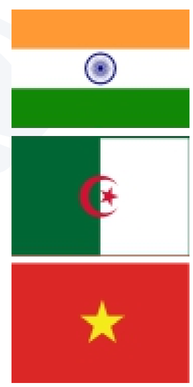
Signs of strain are appearing among both combatants and onlookers alike. The Russians are reported to be withdrawing some of their forces from Syria and Africa, to be recruiting mercenaries among the Syrians and to be deploying irregular forces to the combat zone. Some of these irregulars come with a past history of civilian atrocities. The power vacuum opened up in Syria by the Russian withdrawls is expected to draw in ISIS remnants, Turkey and Iranian proxies. This war is already having effects beyond a simple regional conflict. Surrendered Russian soldiers report fear of being shot as deserters. Morale among Russian generals may not be much better than their men. A breakdown in communication networks has forced generals to assert command authority in person and seven of them have been picked off by Ukrainian snipers. It is estimated that 20 generals are in theater so this represents an unheard of 35% mortality rate for senior officers. A further source of dismay may be Putin who reportedly cashiered eight generals for incompetence after two weeks of operations. The Ukrainians, after enduring sustained shelling of their cities, have announced that they will not accept the surrender of artillerymen. In the besieged town of Mariupol several civilian refuges shelters have been bombed, apparently with some deliberation. Civilian officials have been threatened by the Russians with trial before military commissions and some persons fleeing the town are reportedly being deported to inner Russia. Collectively these acts raise the concern that the Russians intend to annex the region and will engage in ethnic cleansing to facilitate that plan. The war is also proving a bad one for spies. Senior intelligence leadership has been arrested in Russia, branded as traitors in the Ukraine and dismissed in France. We expect a weeding out of Russian agents of influence and sympathizers to be an ongoing activity among the Western powers.

Wins and Losses

At this moment the Russian offensive towards Kiev, judged by Western analysts to have been their main effort, has failed. The Ukrainians are pushing the Russians back enough to put the center of Kiev out of artillery range, although shelling of outlying districts continues. The Russians have succeeded to the South east, however, in establishing a land corridor between their Crimean enclave and the Russian heartland. They have also secured the canal which carries freshwater from the Dnieper river to the Crimea. If they are able to consolidate these tenuous successes, Russia may feel a long term ceasefire along the lines held would represent a partial victory in the conflict. To the North east, the Russian offensive has failed to make headway and has even suffered modest reversals.

US Policy – Deep Game or Continuing Muddle?

Having passed on earlier opportunities, President Biden finally delivered a strong speech in support of the Ukrainians in Warsaw. He closed his speech with the statement "For God's sake this man [Putin] cannot remain in power." For a moment we thought we had finally heard an American commitment to rolling back Russian aggression. But the State Department promptly muddied the message by parsing the speech as "cannot continue to exercise power over the Ukraine." With, we believe, somewhat greater credibility the White House described the comment as a heartfelt expression of the President's moral outrage and not an expression of policy. However this muddle reminded us uncomfortably of the US's messy withdrawl from Kabul and left us with the concern that the Biden national security operation is still not running entirely smoothly behind the scenes. Indeed, the US seems unusually coy about stating its policy objectives and wrapped in odd self imposed restraints on what assistance it will provide to Ukraine. Besides moral outrage, we think Biden's remark likely also revealed a gathering consensus among the Western powers that it is impossible to continue doing business with Putin and that they need his defeat in the Ukraine to be sufficiently sharp as to cause him to be replaced in Moscow at least by a peace minded junta, if not by a full change of regime. The President's muddled delivery is exactly how we would expect such a forming consensus to be expressed at this time. Accordingly, we are expecting to see a gradual ramp up of sanctions and an increasing supply of heavy weaponry to the Ukraine.



Russia's Unhappy Customers

Beyond the immediate battlefield, this conflict has important implications for powers which have heavily bought into Russian military doctrine and equipment. These countries are receiving an urgent notice that their forces are technologically obsolete. Effected countries include the former Soviet states as well as India, Algeria and Vietnam.

A Flood of Refugees

Some four million refugees have flowed out of the Ukraine. So far there they are meeting a humane and supportive response from the asylum countries and from a truly global outpouring of private charity. The flood of refugees is not abating, however, and at some point the capacity of front line states will be exhausted. Indeed Moldavia has already declared itself at limit with a load equal to 10% of its population. Extending a similar proportion to Romania, Hungary and Poland, we can estimate capacity limits will be approached at about the 6 million refugee point. As front line states approach capacity the question of establishing a no fly zone over part of the Ukraine to give a local place of refuge will increase in urgency.

Economic Warfare

For the moment the Western powers (NATO, the EU and affiliated countries) are sustaining but not much increasing their economic offensive against Russia. Russia is attempting to parry this by setting up bilateral trade agreements with friendly and neutral powers (China, India, OPEC, Brazil.) Much diplomacy is no doubt going on beneath the surface as the US attempts to choke off support for Putin and the neutrals hold out for the best available deal. We expect Russia to largely lose this economic warfare.

The Impact on the Economy

The price of oil momentarily touched $128 per barrel (Brent crude), but has fallen back to 103. This is 56% above its February 1st price of 66 – a reasonable value point before a war premium began to effect pricing. The price of Wheat (Chicago future) has risen by 31% over the same period. The major exporters and importers in the wheat market are shown in table 2 (next page.)

US and Canadian wheat stocks are currently only half of capacity at 43.5 million metric tons. This represents an exportable surplus of about 23 Mmt given normal domestic consumption between now and the fall harvest. The world is not faced with immediate famine risk should Ukraine's 2022 harvest be lost. However any crop failures from unseasonable weather could cause a further sharp price rise.

Russia supplies 12% of global nitrogenous fertilizer exports. Certain importers (e. g. Brazil) are unlikely to take a strong political stand against Russia's Ukrainian adventure in consequence. Their political warmth, however, will not stop them from asking for a price discount as compensation for the nuisance of dealing with a pariah supplier. Similarly India is disappointing its Quad political partners by scooping up Russian oil at a discount. Whether this opportunistic behavior will be costly in the long term remains to be seen.

With core commodities disrupted and general unease flowing through commodity markets, producer prices have been rising. For February the increase was at a 10% annualized rate. Increase in producer prices generally show up in rising consumer prices in about 6 months. Central banks will need to cool demand by raising interest rates if they are to forestall development of a wage price spiral. Table 3 shows the situation of some major currencies. Except for China, monetary policy remains strongly inflationary. Interest rate increases of 5% or more will probably be required to stabilize prices. Such rate increases if applied quickly would most likely result in a recession. If applied slowly, however, the likely outcome is weak growth combined with elevated inflation, i.e. stagflation.

Table 3: Money Market and Consumer Inflation Rates, Major Currencies

Currency	Money Rate	Inflation Rate	Real Short Rate
US Dollar	0.61	7.9	-6.76
Euro	-0.458	5.9	-6.00
Pound Sterling	1.47	6.2	-4.45
Swiss Franc	-0.75	2.2	-2.89
Yen	0.000095	0.9	-0.89
Renminbi	2.373	0.9	1.46

Money rate is benchmark 3 month rate. Generally a real short rate below 0.5% leads to accelerating inflation.

Source: Economist (Inflation) and Bloomberg (short rate)

A Look Back at the Stagflation of the 1970s

The last major period of stagflation was in the 1970s. It is worth reviewing what happened in that period. Generally inflation rates rose in most years and interest rates followed with some delay. Rising interest rates led to falling bond prices. Initially equities looked like a haven as revenues rose with inflation. But so too did costs and P/E ratios contracted as interest rates rose. The result was a volatile equity market with prices which were largely trendless in nominal terms but painfully eroded in real terms. Established industries with capital intensive cost bases were hit particularly hard. Growth industries and financials were relatively strong albeit volatile. With interest rates rising slower than prices, the economy was favorable to real estate owners and commodity producers. Considerable speculative activity flowed into these areas creating a bubble which burst painfully once Central banks realized they needed to raise interest rates sufficiently to choke off inflation. Generally it was a miserable decade for many investors, but favorable to the minority approaching retirement who downsized their family home at the real estate peak and used the proceeds to scoop up bonds and equities at the bottom of the market. Besides fortuitously lucky market timers, investors who sustained their strategies through the whole cycle also did well on the eventual recovery. We think Central banks have not entirely forgotten the lessons learned in this period and they will tighten sooner this time if stagflation indeed appears to be setting in.

The Lost Decade of The US Equity Market

Value of $100 Invested in S&P500 on 12/31/1969 with dividend reinvestment.
Line : blue untaxed nominal red taxed nominal yellow untaxed real green taxed real value, based on a 25% tax rate

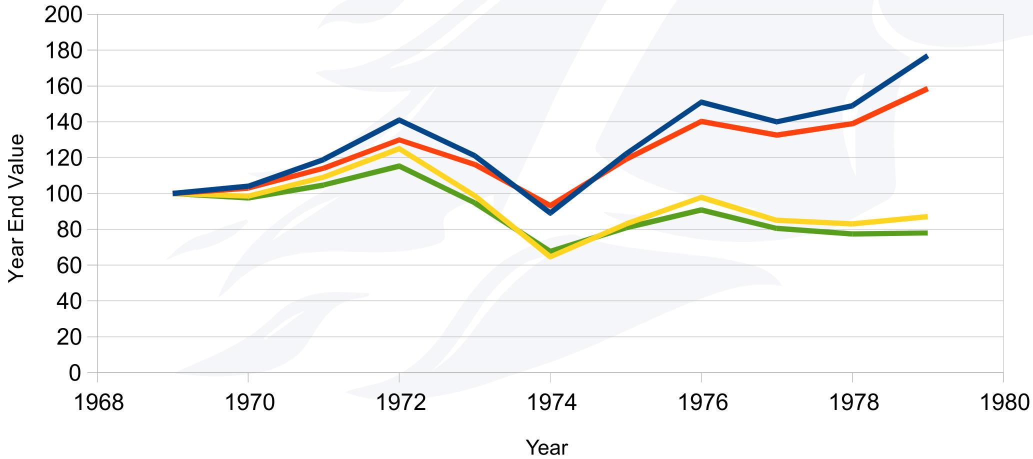


Table 2: Global Trade in Wheat

Major Exporters

Country	**Exports (Mmt)**	**Export % Production**	**% Supply**
USA+Canada	52.2	79%	31%
Russia	37.2	50%	22%
EU	32	23%	19%
Ukraine	18	55%	11%
Australia	10.4	29%	6%
Argentina	10.1	49%	6%
Kazakhastan	5.1	43%	3%
Total	**165**	**43%**	**100%**

A small number of regions supply most of global wheat exports

Large Countries in Near Balance (Mmt)

Country	Production	Consumption	Residual	Residual % Production
China	139	148.5	-9.5	-7%
India	109	104.25	4.75	4%

While normally in balance, a swing in productivity in these countries can be a significant impact on world supply.

Major Importers

Group 1: Countries with local wheat production

Country	Imports (Mmt)	Imports % Consumption
Egypt	13	59%
Turkey	11	40%
Algeria	7.7	68%
Bangladesh	7.4	87%
Iran	7	37%
Brazil	6.5	46%
Japan	5.6	84%
Mexico	5.1	61%
Morocco	4.5	37%
Saudi Arabia	3.5	85%
Uzbekistan	3.2	37%
Afghanistan	2.8	39%
Iraq	2.6	43%
Kenya	2.2	86%
Pakistan	2.2	8%
Sudan	2.15	75%
UK	2	13%
Tunisia	1.9	60%
S Africa	1.9	46%
Ethiopia	1.7	26%
Chile	1.6	52%
Libya	1.4	88%
Azerbaijan	1.4	41%
Tajikistan	1.2	61%
Total	**99.55**	**43%**

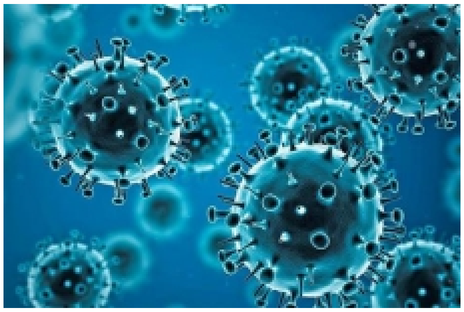
Group 2: Countries without local production

Country	Imports (Mmt)
Indonesia	10.8
Philippines	6.5
Nigeria	6.2
S Korea	4.4
Viet Nam	3.8
Yemen	3.6
Thailand	3.1
Colombia	2
Malaysia	1.9
UAE	1.8
Sri Lanka	1.5
Taiwan	1.4
Venezuela	1.1
Jordan	1.1
Angola	1.1
Total	**50.3**

Wheat is a temperate zone crop so most importers are in tropical or subtropical countries. Group 1 countries grow wheat but not enough to meet local demand. Group 2 countries grow little or no wheat and the local staple is a different grain (in most cases rice.) These countries are importing wheat more as a dietary supplement than to fill a gap in local production.

Source: USDA

Covid



A serious outbreak of Covid has hit China. China has largely escaped the epidemic so far by instituting strong measures of outbreak containment, testing and tracing. On the vaccine front, however, they have relied on local preparations which are somewhat less effective than the mRNA vaccines provided by Pfizer and Moderna. This leaves them rather vulnerable to the super contagious variants of Covid which are now circulating. A mass outbreak in the vulnerable Chinese population should concern the rest of the world as it creates the possibility of further rapid evolution of the virus occurring with eventual spread beyond China.

Researchers have been trying to estimate the true impact of the epidemic by looking at excess deaths. The reasoning is that the total death number is a more accurate statistic than the number of deaths attributed to Covid. Misattribution of cause of death can arise for a host of reasons, ranging from deliberate under reporting by governments to lack of testing facilities and varying protocols on how deaths from mixed cause are counted. The excess death statistic looks instead at the reported number of deaths versus the number that would have been expected based on historical patterns. Covid has three effects on excess deaths. First direct deaths from Covid increase the statistic. Second social disruption from Covid may impact the general healthcare environment leading to increased deaths from other diseases. Third, Covid may influence social behavior and reduce deaths from specific causes. For instance social distancing and masking probably reduced deaths from flu and working from home probably reduced deaths from car accidents. The excess death statistic captures the net effect of these different factors. For the United States excess deaths are running 30% above reported Covid deaths. For India excess deaths are running at three times reported deaths. Overall the adjustment in figures narrows the spread in disease impact between countries without changing the perception of which were harder hit than others.

Domestic Politics

Congressional elections in November are beginning to loom. These ae currently expected to tilt towards the Republicans and in particular towards the Trump Republicans. The likely outcome will be two years of vicious politics in Washington as Congress blocks policy and harasses the President, while the Justice department continues to prosecute Trump's inner circle and the January 6 rioters. Policy will likely be deadlocked until the 2024 election.

A raft of Supreme Court decisions are expected in coming months. They will likely uphold State restrictions on abortion while overturning State efforts to police gun ownership. These will add heat to cultural battles but have little impact on the economy. Of more economic moment will be decisions on the Federal government's powers to regulate greenhouse gasses. Here the Court is likely to frustrate the attempt to establish rational policies. We will assess the impact once we have a decision in hand.

The Green Transition

As described in our research piece of last year, we believe a profound movement away from fossil fuels is underway worldwide. This transition is being driven increasingly by economics rather than by politics or technology. Better policies would of course help and currently the US is lagging in the development of green technologies because of the political power of the fossil fuel industry in blocking transition supportive policies. However, the more important issues are technological. One key enabling technology is an effective broadly implementable technology capable of storing utility scale power generated from renewables over time frames of a few hours to a week. One candidate is thermal storage based on either cold (liquid air) or hot (molten salt) designs. Liquid air based plants are currently being deployed in particularly favorable geographies. A new storage technology candidate in the form of gravity storage has emerged. A Swiss company is claiming 90% storage efficiency from a design only slightly more complicated than the weights which power a grandfather clock. If this claim is substantiated in practice, then the storage hurdle to increased use of renewables will be cleared. Overall we expect green technologies to emerge at an accelerating rate and the green transition to be achieved faster and at lower cost than estimates based on current technologies. Similarly, in Europe the political mandate to phase out Russian fossil fuels will only act to accelerate the transition. Meanwhile, war driven disruption of markets has been beneficial to oil companies. We regard these upticks as bear market rallies and as favorable opportunities for lightening portfolios of fossil fuel commitments.

Financial Market Performance

US equities were basically flat for the month. Large cap growth sold off slightly, while large cap value and mid/small cap rose slightly. International equities were weak with emerging markets weaker than developed. Bonds continued to fall across the board with particular weakness in long dated issues and relative strength in TIPS. Commodities were up with oil rising 13% on war driven disruption. Similarly war fears drove the Euro down -9.6%. One could characterize the market as concerned about war and inflation and favoring relatively safe havens.

Recent Market Performance

Category	Asset Class	6 month trend	3 month return	1 month return
Equity	US Large Cap	flat	-0.86%	0.09%
	US Large Cap Growth	flat	-4.94%	-0.60%
	US Large Cap Value	flat	0.04%	0.72%
	Growth – Value	falling	-4.98%	-1.32%
	US Mid/Small Cap	flat	-4.00%	1.12%
	Intl Developed	slipping	-3.08%	-3.25%
	Intl Emerging	slipping	-6.14%	-6.37%
Fixed Income	3-7 Year Treasury	falling	-6.28%	-4.26%
	7-10 Year Treasury	falling	-8.30%	-5.34%
	TIPS	falling	-4.90%	-2.02%
	Muni	falling	-6.14%	-3.77%
	Investment Grade	falling	-6.87%	-4.35%
	Medium Grade	falling	-4.15%	-3.42%
	Preferred	falling	-5.53%	-3.62%
Commodity	REIT	rising	5.49%	4.92%
	Euro	falling	-10.42%	-9.63%
	Gold	rising	9.25%	6.86%
	Oil	rising	49.50%	13.22%

Advice

We regard the Ukraine war as a serious strategic blunder on Russia's part which will end up terminating Russia's attempt to play the part of a global power. However, we expect Russia to persist on this failing course until faced with the possibility of catastrophic losses. That realization may be delayed until some considerable time and bloodshed have first come to pass. Meanwhile, we expect the economy to reconfigure itself relatively rapidly to the new parameters with ever less impact occurring on markets from the war. Of greater importance for investors is the process by which inflation gets wrung out of the global economy. In the short term, war disruption provides an excuse for going slow. In fact, there is always some excuse or other for postponing dealing with inflation. Ultimately, however, rates must rise considerably with a cyclical recession and falling commodity prices as the result. Meanwhile, commodities and real estate are likely to exhibit favorable upward momentum.

Our advice remains the same – investors should form and maintain a sound long term strategy based on their individual circumstances and objectives. Political turmoil and the business cycle are ultimately epiphenomena which should not lead one into strategy distortions.