

EXECUTIVE SUMMARY

FOOD FOR THOUGHT

Investment Opportunities Across a Changing Food System

INTRODUCTION

From farm to fork, our global food system is vast, complex, inefficient and increasingly unfit for purpose. We believe understanding and navigating the rapid evolution of our fragile global food system is important for asset owners for four primary reasons:

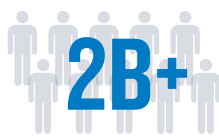
1. Vulnerabilities in the food supply chain are driving critical macroeconomic outcomes, both monetary and fiscal
2. Food and farmer security is critical in evaluating domestic political stability – across both emerging and developed markets – and cross-border geopolitical risks, such as those posed by the war in Ukraine.
3. The global food system is transforming and the current inflection point create unique investment opportunities in both public and private markets
4. Investing in the food system provides opportunities for investors to further ESG goals and have a measurable impact.

For investors, it is especially critical to identify the compelling supply and demand forces reshaping the entire food value chain.

UNEQUAL DISTRIBUTION OF CALORIES



One of every nine people is undernourished (800M+ people)



Over two billion people worldwide are obese or overweight

FOOD WASTE



2.5 billion tons of food lost or wasted each year throughout the food value chain

CLIMATE AND AGRICULTURE



Climate change is causing a 12% decline in crop yields

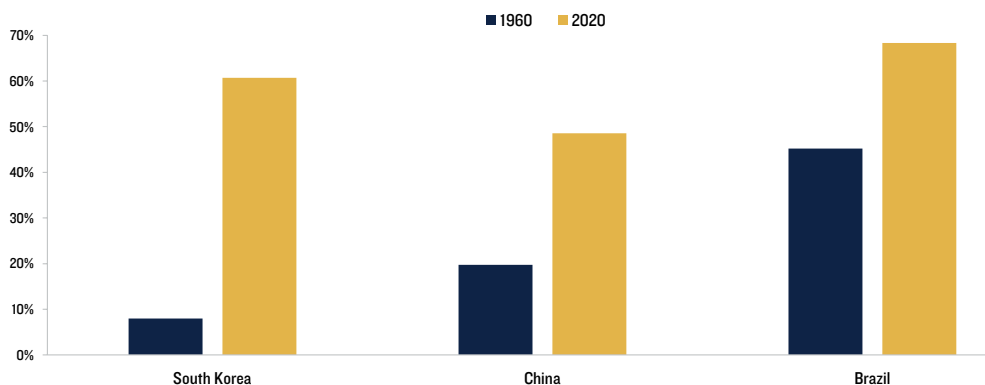
RISING AFFLUENCE & SHIFTING PREFERENCES ARE RESHAPING FOOD DEMAND



Three drivers are critical to understanding global food demand and are an essential part of any investment decision across the food system:

- 1) **Rising affluence will be a key driver of food demand.** As countries grow in affluence, their food consumption patterns change dramatically. Alongside population growth, this income effect has strong implications on food demand as more countries approach middle-income status.
- 2) **Diets are converging globally.** Over the last few decades, emerging and frontier markets have seen a shift to a “western” diet. That is, a diet heavy on animal proteins, dairy products, wheat, oils and sugar. This trend will persist going forward.
- 3) **Global consumer preferences are evolving in different ways.** There is a global trend towards convenience and in-home dining. Consumers in emerging markets are driven by packaged and delivered food in general, while health and wellness concerns are paramount for consumers in developed markets.

SHARE OF TOTAL DAILY CALORIES FROM A “WESTERN DIET”



GLOBAL DEMAND FOR PREPARED FOODS & MEALS IS SET TO GROW

↑ **70%**
TO
\$250
BILLION BY 2029

Source: United Nations, Food and Agriculture Organization. Note: In this chart, “western diet” refers to animal proteins, dairy products, wheat, vegetable oils and sugars.

INVESTMENT IMPLICATIONS ACROSS FOOD DEMAND

- | | |
|---|--|
| <p>1. Meat producers offer a contrarian investment opportunity</p> | <ul style="list-style-type: none"> • More affluent populations and convergence of global diets create opportunity for meat producers • ESG investors should consider engaging with conventional meat manufacturers |
| <p>2. Cold storage and transportation provide global opportunities</p> | <ul style="list-style-type: none"> • Proximity to urban centers and transportation hubs are key • Cold logistics providers and real estate in the US, SE Asia and Latin America can be attractive |
| <p>3. Packaging offers cash flows no matter the underlying food fad</p> | <ul style="list-style-type: none"> • Irrespective of the trend, food innovation is reliant on new packaging and machinery • Seek out leading packaging firms as well as equipment makers in the US and Europe |
| <p>4. Health and wellness options drive grocery and food innovation</p> | <ul style="list-style-type: none"> • Consumers are seeking healthier food options and may be willing to pay up for it • Look for companies that are closing the gap on price and taste rather than relying on changes to consumer tastes |
| <p>5. Convenience and food safety drives emerging market opportunities</p> | <ul style="list-style-type: none"> • Concerns around food safety in EM has led to demand for recognized brands and packaged foods • Regional bakers and bottlers offer opportunities in India and Latin America |

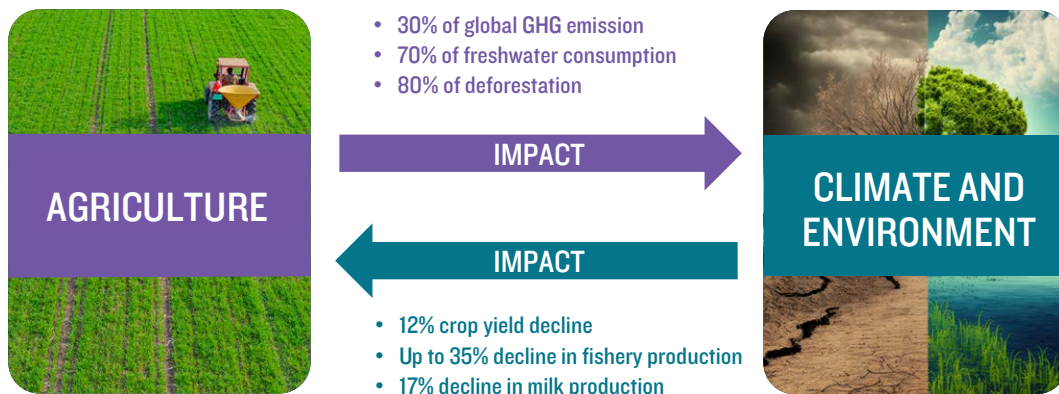
FOOD SUPPLY: CLIMATE AND INNOVATION ARE TRANSFORMING PRODUCTION



The food supply chain is being transformed by two drivers that investors cannot ignore:

- 1) **The feedback loop between the environment and agriculture.** While the adverse effects of climate change on food production are well-reported, less attention is paid to the large imprint the food system leaves on the environment.
- 2) **Technology and innovation are critical.** To meet the challenges of the future, technology and innovation will need to play a leading role in making our food system more productive and sustainable. It is important for investors to recognize that real innovation is taking place in global incumbents as well as trendy tech startups.

AGRICULTURE AND THE ENVIRONMENT IMPACT EACH OTHER



Source: PGIM Thematic Research.

INVESTMENT IMPLICATIONS ACROSS FOOD SUPPLY

- | | |
|---|--|
| <p>1. AgTech driving smarter, more sustainable food production on small farms</p> | <ul style="list-style-type: none"> • Finding ways to enhance productivity of small-scale farms is critical to meeting future food demands • AgTech landscape is fragmented with many startups and can offer attractive VC investments |
| <p>2. Farmland debt and equity offer a unique exposure and attractive investment</p> | <ul style="list-style-type: none"> • A range of risk-reward propositions for debt and equity investors • California is especially attractive for investors because of its optimal climate and proximity to major exchanges, ports and highways |
| <p>3. Crop science and feed additives solutions to boost productivity and sustainability</p> | <ul style="list-style-type: none"> • Leaders in Asia have local expertise and established distribution networks • Leaders in Europe and North America offer real-world products and have diversified businesses and scale |
| <p>4. Precision agriculture improves efficiency of larger farms</p> | <ul style="list-style-type: none"> • Opportunities in both large global agriculture equipment makers as well as tech startups • Latin America provides growth opportunities as farmers in Brazil and Argentina modernize |
| <p>5. Fertilizers will remain essential to maintain and enhance crop yields</p> | <ul style="list-style-type: none"> • Annual need for some fertilizers provides steady source of demand that are not easily replaced • ESG-minded investors should strongly consider engagement with this sector as they will be vital to food production for some time |
| <p>6. Cultivated meat: More sizzle than steak for investors</p> | <ul style="list-style-type: none"> • The market for cultivated meat is highly fragmented with serious challenges and much uncertainty • Investors should instead focus on production of simple proteins (i.e., whey or egg albumen) for commercial use |

PORTFOLIO-WIDE INVESTMENT IMPLICATIONS



There are also important cross-portfolio implications from the transformations underway in the global food system, including:

- 1) **Disruptions in food distribution may reveal geopolitical and macroeconomic vulnerabilities.** Interruptions in food supply chains can threaten food security, drive price inflation and be highly disruptive. This can even lead to social and political instability – especially in frontier and emerging markets. Investors need to recognize interruptions to the food supply chain are likely to be more frequent going forward and may want to consider supplementing their assessment of country risk to account for these disruptions.
- 2) **Today's food system provides a vital good with inherent ESG tensions and opportunities.** For investors with commitments to decarbonization and sustainability, there is a growing recognition that the broad food system needs to play a vital role in achieving both objectives. The report highlights the importance for ESG investors to engage with all sectors across the food system, seek out innovative incumbents, and work to narrow the ESG data gap at companies across the food value chain.
- 3) **Farmland investing provides diversification and inflation protection.** Institutional investors may want to evaluate an allocation to farmland within their portfolio because it offers some potentially beneficial portfolio characteristics, in particular a low correlation major asset classes and a relatively reliable inflation hedge and store of wealth during uncertain times.

EXPLORE THE FULL PAPER →

Professional Investor Use Only. All investments involve risks, including possible loss of principal. Past performance is not indicative of future results. The information contained herein is provided by PGIM, Inc., the principal asset management business of Prudential Financial, Inc. (PFI), and a trading name of PGIM, Inc. and its global subsidiaries. PGIM, Inc. is an investment adviser registered with the U.S. Securities and Exchange Commission (SEC). Registration with the SEC does not imply a certain level of skill or training. In the United Kingdom, information is issued by PGIM Limited with registered office: Grand Buildings, 1-3 Strand, Trafalgar Square, London, WC2N 5HR. PGIM Limited is authorised and regulated by the Financial Conduct Authority ("FCA") of the United Kingdom (Firm Reference Number 193418). In the European Economic Area ("EEA"), information is issued by PGIM Netherlands B.V. with registered office: Gustav Mahlerlaan 1212, 1091 LA Amsterdam, The Netherlands. PGIM Netherlands B.V. is, authorised by the Autoriteit Financiële Markten ("AFM") in the Netherlands (Registration number 15003620) and operating on the basis of a European passport. In certain EEA countries, information is, where permitted, presented by PGIM Limited in reliance of provisions, exemptions or licenses available to PGIM Limited under temporary permission arrangements following the exit of the United Kingdom from the European Union. These materials are issued by PGIM Limited and/or PGIM Netherlands B.V. to persons who are professional clients as defined under the rules of the FCA and/or to persons who are professional clients as defined in the relevant local implementation of Directive 2014/65/EU (MiFID II). In Italy, information is provided by PGIM Limited authorized to operate in Italy by Commissione Nazionale per le Società e la Borsa (CONSOB). In Japan, information is provided by PGIM Japan Co., Ltd. ("PGIM Japan") and/or PGIM Real Estate (Japan) Ltd. ("PGIMREJ"). PGIM Japan, a registered Financial Instruments Business Operator with the Financial Services Agency of Japan offers various investment management services in Japan. PGIMREJ is a Japanese real estate asset manager that is registered with the Kanto Local Finance Bureau of Japan. In Hong Kong, information is provided by PGIM (Hong Kong) Limited, a regulated entity with the Securities & Futures Commission in Hong Kong to professional investors as defined in Section I of Part I of Schedule I of the Securities and Futures Ordinance (Cap. 571). In Singapore, information is issued by PGIM (Singapore) Pte. Ltd. ("PGIM Singapore"), a regulated entity with the Monetary Authority of Singapore under a Capital Markets Services License to conduct fund management and an exempt financial adviser. This material is issued by PGIM Singapore for the general information of "institutional investors" pursuant to Section 304 of the Securities and Futures Act 2001 of Singapore (the "SFA") and "accredited investors" and other relevant persons in accordance with the conditions specified in Section 305 of the SFA. In South Korea, information is issued by PGIM, Inc., which is licensed to provide discretionary investment management services directly to South Korean qualified institutional investors on a cross-border basis. These materials are for informational or educational purposes only. The information is not intended as investment advice and is not a recommendation about managing or investing assets. In providing these materials, PGIM is not acting as your fiduciary. These materials represent the views, opinions and recommendations of the author(s) regarding the economic conditions, asset classes, securities, issuers or financial instruments referenced herein. Distribution of this information to any person other than the person to whom it was originally delivered and to such person's advisers is unauthorized, and any reproduction of these materials, in whole or in part, or the divulgence of any of the contents hereof, without prior consent of PGIM is prohibited. Certain information contained herein has been obtained from sources that PGIM believes to be reliable as of the date presented; however, PGIM cannot guarantee the accuracy of such information, assure its completeness, or warrant such information will not be changed. The information contained herein is current as of the date of issuance (or such earlier date as referenced herein) and is subject to change without notice. PGIM has no obligation to update any or all of such information; nor do we make any express or implied warranties or representations as to the completeness or accuracy or accept responsibility for errors. These materials are not intended as an offer or solicitation with respect to the purchase or sale of any security or other financial instrument or any investment management services and should not be used as the basis for any investment decision. No risk management technique can guarantee the mitigation or elimination of risk in any market environment. Past performance is not a guarantee or a reliable indicator of future results and an investment could lose value. No liability whatsoever is accepted for any loss (whether direct, indirect, or consequential) that may arise from any use of the information contained in or derived from this report. PGIM and its affiliates may make investment decisions that are inconsistent with the recommendations or views expressed herein, including for proprietary accounts of PGIM or its affiliates. Any projections or forecasts presented herein are as of the date of this presentation and are subject to change without notice. Actual data will vary and may not be reflected here. Projections and forecasts are subject to high levels of uncertainty. Accordingly, any projections or forecasts should be viewed as merely representative of a broad range of possible outcomes. Projections or forecasts are estimated, based on assumptions, and are subject to significant revision and may change materially as economic and market conditions change. PGIM has no obligation to provide updates or changes to any projections or forecasts. PGIM and its affiliates may develop and publish research that is independent of, and different than, the recommendations contained herein. PGIM's personnel other than the author(s), such as sales, marketing and trading personnel, may provide oral or written market commentary or ideas to PGIM's clients or prospects or proprietary investment ideas that differ from the views expressed herein. © 2023 PFI and its related entities, registered in many jurisdictions worldwide.

留意事項

- ※ 本資料は米国 SEC の登録投資顧問会社である PGIM インクが作成したものです。
- ※ 本資料は情報提供を目的としたものであり、特定の金融商品の勧誘又は販売を目的としたものではありません。また、本資料に記載された内容等については今後変更されることもあります。
- ※ 記載されている市場動向等は現時点での見解であり、これらは今後変更することもあります。また、その結果の確実性を表明するものではなく、将来の市場環境の変動等を保証するものでもありません。
- ※ 本資料に記載されている市場関連データ及び情報等は信頼できると判断した各種情報源から入手したものです。その情報の正確性、確実性について当社が保証するものではありません。
- ※ 過去の運用実績は必ずしも将来の運用成果等を保証するものではありません。
- ※ 本資料は法務、会計、税務上のアドバイスあるいは投資推奨等を行うために作成されたものではありません。
- ※ 当社による事前承諾なしに、本資料の一部または全部を複製することは堅くお断り致します。
- ※ 本資料内で取り上げられた資産クラス、個別セクター等はあくまで例示目的であり、推奨ならびにこれらにかかる将来性を明示・暗示的に示唆するものではありません。
- ※ “Prudential”、“PGIM”、それぞれのロゴおよびロック・シンボルは、プルデンシャル・ファイナンシャル・インクおよびその関連会社のサービスマークであり、多数の国・地域で登録されています。
- ※ PGIM ジャパン株式会社は、世界最大級の金融サービス機関プルデンシャル・ファイナンシャルの一員であり、英国プルデンシャル社とはなんら関係がありません。

PGIM ジャパン株式会社

金融商品取引業者 関東財務局長（金商）第 392 号

加入協会：一般社団法人投資信託協会、一般社団法人日本投資顧問業協会、一般社団法人第二種金融商品取引業協会

PGIMJ99030