The Effect of Inflation on Business Investment Decisions in Emerging Economies

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ABSTRACT

This article seeks to comprehend, in light of the declared inflation target rate, under what circumstances A large amount of investment might end up in emerging market economies (EMEs). Because of this, we use an Agent-based Computational Economics (ACE) model to include a stochastic learning rule into the game that Asako et al. (2017) presented. Making investment choices is like playing a stage game, and entrepreneurs and workers do it repeatedly. The underlying assumption is that investments are mutually supportive, and that several evolutionary equilibrium solutions are possible. To boost predicted profits, I. investments must be innovative and create demand, and (ii) the central bank's proclaimed target inflation rate must be credible. If we want to steer the EMEs to the long-run equilibrium, where everyone invests at the goal inflation rate, we need these conditions. Two main areas are mainly impacted by our ACE and EGT learning models.

KEYWORD: emerging market economies, Computational Economics, Entrepreneurs, Investments, BUSINESS

INTRODUCTION

Investments Investing in land, equipment, training, digital technologies, green practices, intellectual property, and so on are just a few examples of what organizations should do if they want to grow. A volatile economy increases the danger of investing (Dejuan-Bitria & Ghirelli, 2021; Kellogg, 2014; Larch et al., 2022). Supply shocks after the COVID-19 lockdowns, energy price spikes caused by Russia's aggressive war in Ukraine, and interest rate hikes to fight inflation have all contributed to a worsening investment climate (Delanote et al., 2022; EIB, 2023; Kolev & Randall, 2023; PPMI et al., 2023).).

In this piece, we'll take a look at how investment choices made by companies, particularly SMEs, and inflation, which started to grow sharply in 2021. Operating expenses rise in response to rising energy and raw material prices, cutting into profit margins and decreasing available cash. Despite this, eighty percent of EU businesses turned a profit in 2023 as a result of the governmental funding they got during the epidemic and the subsequent quick demand recovery; this enabled them to save up for future investments (EIB, 2024).

Additionally, businesses that have plenty of cash on hand or can easily get loans from outside sources may be able to weather the storm (Cleary, 1999; Cleary et al., 2007). However, firms with less cash on hand, such as startups, small businesses, or those heavily indebted to intangible assets, or those severely impacted by the current financial climate (e.g., high levels of accumulated debt or unsustainable financing costs relative to slim profit margins), will not be so fortunate. Inflation makes it harder for firms to borrow money because Interest rate hikes are a tool used by central banks to control the money supply. The overall

growth potential may be significantly affected by this.

Assuming that producers can keep their profit margins stable by-passing costs onto consumers (the so-called "cost pass-through rate"), we go deeper into how inflation impacts investment choices. Firms are unlikely to be able to completely pass costs onto consumers, according to previous and current research (Peltzman, 2000; Joussier et al., 2023; Dupré & Magerman, 2021; Loy et al., 2016). Positive cost shocks also lead to price increases more quickly than negative ones. These findings suggest that producers may be subject to price shocks on par with consumers. The main factor contributing to consumer price inflation in 2022 was, without a doubt, the more than 40% rise in energy prices from June 2021 to June 2022 (Eurostat, 2023b).

Even more devastating for companies was the 98% yearly increase in energy producer price inflation that occurred over across the whole European Union in the same time frame (Eurostat, 2023c). This article delves further than just analyzing how producer inflation has impacted corporate investment decisions. It also explores how inflation may impact investment depending on businesses' inclination to pass the cost increases on to consumers. With the help of the EIB's Investment Survey and its wealth of data, we can analyse the relationship between investment and the uncertain economic environment. We can also see how energy efficiency measures, which reduce costs, can encourage firms to invest more.

LITERATURE REVIEW

Zhang, Runs Huo et.al. (2025). Examining the good and bad consequences of inflation on the economy is the central topic of this paper's study. It explains inflation's many effects on the economy by citing pertinent literature and examining concrete examples. Inflation has changed the economic environment, and this study looks at how different administrations have dealt with this problem. Producers' investment choices are impacted by inflation, which in turn affects consumers' day-to-day life. While this is happening, inflation is having an impact on other types of financial goods like real estate and stock markets, which might cause economic imbalances and jeopardise the stability of the whole financial industry. Building on these points, this paper delves into the ways inflation may impact the economy in ways that are both beneficial and detrimental. With one side, it has the potential to spur consumption and investment, which in turn boosts inflation. On the other hand, inflation has its share of negative consequences, such as lower purchasing power for consumers, higher living costs, producers' difficulties in making decisions due to cost escalation, and worsened uncertainty in the financial sector like stocks and real estate, which can Furthermore, the study delves into the various fiscal and monetary policies that governments might use to tackle inflation head-on, while also protecting economic stability and promoting sustainable growth.

Chisti, Khalid et.al. (2015) An effort to assess what impact is the impact of inflation on the income per capita? of underdeveloped countries is undertaken in this study. The study's goal was accomplished by focussing on five BRICS member nations—the world's most important rising economies. Information pertaining to the thirteen years 1999–2001 has been retrieved for the aim of analysis. Using a regression model, we find showed the correlation between inflation and per capita income in South Africa, Brazil, and India is not statistically significant. The findings do reveal, however, that inflation is a statistically significant independent variable that affects per capita income.As a result, it's safe to say that a country's per capita income won't shift only because inflation does.

Nishanth, M et.al. (2024). Increasing the saving rate, giving knowledge about investments, and enhancing capital allocation are all ways in which the financial sector contributes to economic development by

facilitating capital accumulation and technological advancement. Each of these two indexes tracks the monthly change in prices of goods and services, but they use different methods to determine inflation. Achieving Price Stability with Monetary Policy The goal of monetary interventions is to decrease monetary revenue.(a) Credit Management: Monetary policy is a crucial intervention in the world of money. Since inflation causes prices to rise across the board, it follows that long-term investments with low interest rates will have less purchasing power once inflation sets in.

Madsen, Jakob. (2003). Since inflation reduces the accounting profits of leveraged enterprises and makes depreciations for tax purposes cost historical values, this article contends that inflation limits investment. A substantial negative relationship between inflation and investment in non-residential buildings and structures, machinery, and equipment has been found in empirical estimates obtained from panel data for OECD nations. This suggests that the high level of investment activity seen in these nations during the last decade was greatly influenced by the low inflation environment of the 1990s. The Scottish Economic Society in 2003. This is a copyright notice.

Bela nova, Katarína. (2023). Many aspects of a company's operations and existence are susceptible to inflation's effects. Its impact on input and output price changes is the most substantial, however these changes are often not uniform. In light of the recent spike in inflation and general unpredictability in the SR, this essay seeks to both assess the current state of company finances and to speculate on how they could evolve in the future. We begin by highlighting, using the available statistics, the fact that, on average, companies were successful in turning increasing expenses into revenues. After that, we run a development simulation using two different situations. Cost rise and demand drop are the two primary shocks that we primarily model. A sudden and unequal spike in pricing, the research shows, may shake up the economic sector and hurt some companies. We also show that different types of firms feel different effects of inflation.

RESEARCH METHODOLOGY

Given the Central Bank's indicated inflation targeting rate, we will demonstrate the foundations of the strategic choice on the investments that businesses and labour will make, with the goal of better igniting the conversation from the previous part. So, to enhance our study, we use an ACE method and Take EMEs into account using the model proposed by Asako et al. (2017). This is an example of a strategic relationship between workers and entrepreneurs. One such representation is a one-dimensional continuum space. One member of each population is selected at random to take part in the stage game. For τ rounds, where τ may be any number from zero to infinity, the two-period stage game is played without end.

Table 1: The Performance Game.

Stage Game	Decision on investment (t_0)	Profits (t_1)
Entrepreneur	physical capital k	$(1-\beta)\pi$
Worker	human capital h	$\beta\pi$
Firm	production and sales x_0	production and sales x_1

Table 1 for the worker's or entrepreneur's investment in physical or human capital at time t0, denoted as h (k) ∈ R+. The pair (x0, x1) ∈ R 2 + gives the company the level of production in t0 and t1. At the same

instant (t0), the entrepreneur and the worker both decide on the investment. In period t1, the quantity produced by the company, x1, may fluctuate, taking into consideration the current information available. At the point in time represented by t1, the business owner pays the employee a percentage $\beta \in (0, 1)$ of the overall profit made by the company after the creation of the finished product. The sum of the firm's actual profits is shown by:

$$\pi = \frac{p_0 - \upsilon_0}{\gamma} x_0 + \frac{1}{1+r} \frac{p_1 - \upsilon_1}{\gamma_1} x_1,$$

where $(p_0, p_1) \in R^2_{++}$ represents the pricing of the firm's commodities at time intervals of 0, 1. The values of $(\upsilon_0, \upsilon_1) \in R^2_+$ represent the variable cost of manufacturing 7. The actual The interest rate is represented as $r \in R$, and the amount of money spent in the economy is $(\gamma_0, \gamma_1) \in R^2_{++}$. The term γ_1 is not visible until t1 comes to a close. In each player's case, γ_1 is equal to $\tilde{\gamma}_1$. In order to determine the worth of $\tilde{\gamma}_1$, participants use the price level recorded at $t = 0$, γ_0, together with stated inflation target rate by the central bank. According to Sims (2003), this presumption is in line with the results of the rational inattention issue. Those agents aren't a threat. At times $t = 0$ and 1, the goods' demand functions are

$$x_t = d_t - \epsilon(p_t - \gamma_t).$$

Keep in mind that the demand for the good is denoted by $d_t \in R_{++}$ when $p_t = \gamma_t$, and that the elasticity of demand with regard to the relative price $(p_t - \gamma_t)$ is $\in R_{++}$. From what we can see so far, the inverse demand functions are given by equations (1) and (2). for the pair (p0, p1), respectively:

$$p_0 = \gamma_0 + \frac{1}{\epsilon}(d_0 - x_0),$$

$$p_1 = \gamma_1 + \frac{1}{\epsilon}(d_1 - x_1).$$

The inverse demand functions may be expressed as the price-competition impact (γ_0, γ_1) and the goods property effect $(d_0/, d_1/)$ using linear decomposition. With the stage game at t=0, the following is the estimated price in t=1 according to (2)::

$$E[p_1] = \tilde{\gamma}_1 + \frac{1}{\epsilon}(E[d_1] - x_1).$$

It is believed that both the worker's and the entrepreneur's investments consist of innovations that reduce costs and those that increase demand. The entrepreneurs are presented with a continuous interval of invention kinds $\ddot{o} \in [0, 1]$ to choose from when they accomplish this. The basic demand and the variable cost, denoted as (d_0, ϕ_0), are constants at time $t = 0$. In contrast, the distributions of the random variables (d_1, υ_1) are conditional on the amounts of investments k and h at $t = 1$. Furthermore, it is assumed that investment leads to a drop in variable costs and a rise in basic demand when the amounts of the various kinds of investment above the corresponding threshold values $k \in R_+$ or $h \in R_+$. Basically, when both parties opt to invest, the predicted base demand as well as the variable cost are represented by the pair (d_I, ϕ_I), respectively. If no player decides to invest, then we get the pair (d_N, ϕ_N).

DATA ANALYSIS
Here, we showcase the outcomes16 that the ACE algorithm produced. To do this, we use the payoff matrix

provided by (6) and plug in the values from Table 2 for each EMES. Therefore, the analytical solution obtained from replicator dynamics is no longer relied upon by evolutionary dynamics. The criteria for updating the strategy now adhere to the formula in equation (9). Here is how we categorise the EMEs for the purpose of comparing and evaluating player strategies: Latin American nations include Brazil, Chile, Colombia, Mexico, and Peru. In addition to South Africa, BRICS members include India and Russia. As a last group of Asian nations, we have Thailand, the Philippines, and South Korea. The Central Bank of EMEs has been working to raise the anticipated returns for investors, as discussed in Sections 4.1 and 4.2.

Countries	IT (%)	LB (%)	UB (%)	i (%)	d_i	$\underline{h}$	$\underline{k}$	$s_{e_{IT}} ; s_{w_{IT}}$	$s_{e_{zero}} ; s_{w_{zero}}$
Brazil (BR)	4.25	2.75	5.75	6.50	850	9.75	9.75	0.09	0.13
Chile (CH)	3.00	2.00	4.00	2.50	450	3.25	3.25	0.13	0.16
Colombia (CO)	3.00	2.00	4.00	5.50	750	7.75	7.75	0.08	0.10
India (IND)	4.00	2.00	6.00	6.50	850	9.75	9.75	0.07	0.11
Mexico (ME)	3.00	2.00	4.00	7.00	900	10.5	10.5	0.05	0.09
Peru (PE)	2.00	1.00	3.00	3.75	575	4.75	4.75	0.08	0.09
Philippines (PHI)	3.00	2.00	4.00	3.00	500	3.75	3.75	0.08	0.11
Russia (RUS)	4.00	-	-	7.25	925	11.25	11.25	0.08	0.10
South Africa (SAF)	-	3.00	6.00	6.75	875	10.25	10.25	0.08	0.11
South Korea (SKO)	2.00	-	-	1.25	325	2.00	2.00	0.30	0.37
Thailand (THA)	2.50	1.00	4.00	1.50	350	2.00	2.00	0.13	0.19

Table 2: An alphabetical list of the nations that participated in the ACE model. IT stands for the declared Inflation Objective. LB stands for the lower bound and UB for the upper limit. With i, we get the interest rate. The predicted fundamental demand, denoted by di, is influenced by the quantity of investments in human and physical resources, which in turn are affected by the projected inflation rate, denoted as $(\tilde{\gamma}1/\gamma0) - 1$. The pair (seIT ; swIT) stands for the proportion of entrepreneurs investing in physical capital and the proportion of employees putting money into their own professional development at the same time that the FED announces its intention to pursue the inflation objective. The pair (sezero ; swzero) stands for the proportion of entrepreneurs investing in physical capital and the proportion of employees that put money into their own professional development, when the Central Bank indicates its intention to pursue a zero inflation rate. Data may be found at Assuming the inflation rate that the central bank aims to achieve, the ACE outcomes for Latin American EMEs are shown on the left side of Figure 1. For Mexico to achieve equilibrium with both participants investing, the proportion of entrepreneurs (MEe) and workers (MEw) ready to put money in must be at least 5% at time t = 0.

The Mexican Central Bank has a monumental challenge ahead of it: boosting its credibility in the face of high investment decision costs that may discourage investment and an anticipated rise in inflation. Monetary policy signalling is the most effective means of accomplishing this objective. So, if the Central Bank is forthright about its inflation target—that is, if it is really achieved—then there may be a synchronisation of expectations, which in turn encourages investment by both employees and business owners.

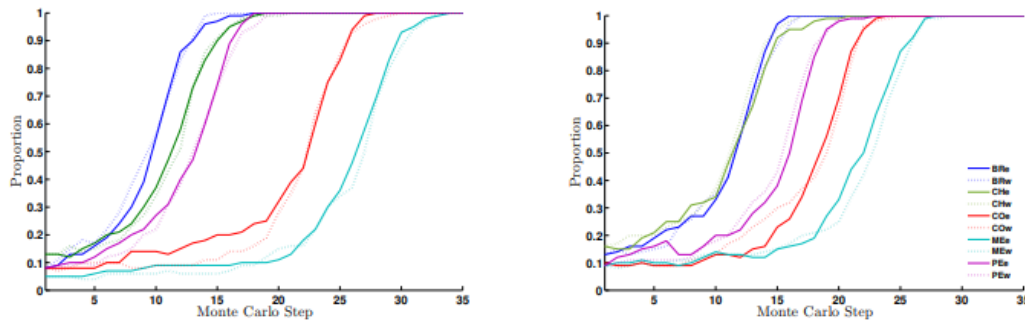Entrepreneurial and Worker-Investing Populations in Latin America Nation States

Figure 1: ACE. Left: The goal inflation rate is being pursued by the Central Bank. True: A zero-inflation rate is the goal of the Central Bank. The percentage of business owners and employees in each Latin American country using method I is shown by the solid lines, while the percentage using strategy II is shown by the dashed lines.

The outcomes when the monetary authority aims for zero inflation are shown seen in Figure 1 to the right. Without a doubt, in Mexico and Peru, the equilibrium is achieved when neither the businesses nor the workers are prepared to spend if the share is less than 9%. In the case of Colombia, this figure is 10%. Keep in mind that the Brazilian and Chilean economies need more action from the central bank to win over investors. When both employees and business owners in Brazil (Chile) are prepared to put money into the economy, the ESS is achieved (NI, NI). A lower gap With relation to the benefits of the synchronized plans justifies the requirement for a bigger starting proportion of players ready to invest when the Central Bank wants a zero inflation rate, regardless of the particularities of any Latin American EME. There must be a heightened effort by the monetary authority to restore faith in the economy. Agents are more inclined to spend in the hope of reaping the rewards of this strategic choice if they do this.
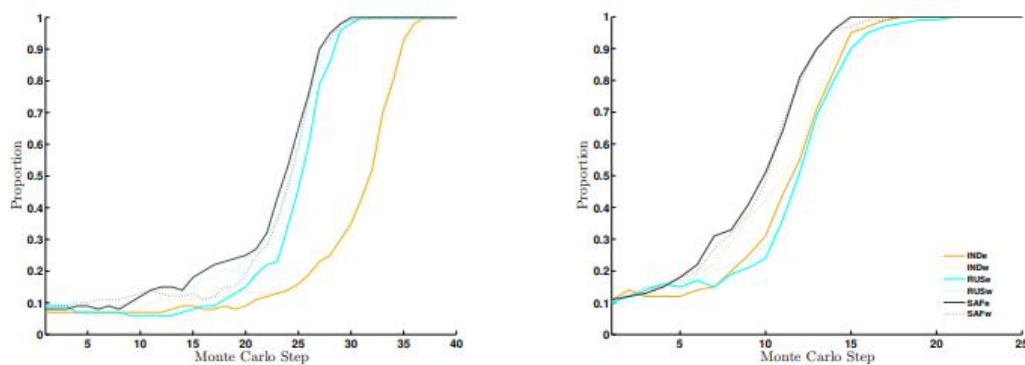

Figure 2: The Central Bank strives to achieve the target inflation rate (ACE).

Figure 2's dynamics, when compared to Figures 1 and 3, reveal that the BRICS nations are quite similar in terms of the starting fraction of participants needed to reach the steady state when both participants invest. The strategy interactions' payoffs are based on variables with high (and comparable) values, which explains this pattern of behaviour. South Africa and Russia achieve a state of parity around the MCS.30, as seen on the left side of Figure 2. Around the MCS.40, India finds a balance. The lower payout difference when both players coordinate (N I, N I) and when they coordinate (I, I) may be explained by this. Keep in mind that the right side of Figure 2 makes this disparity in convergence rates less obvious. As we have shown, the credibility of monetary authority is crucial, and it is clear that when the Central Bank aims for zero inflation, investment decisions are coordinated more rapidly.

You should know that thirty percent of respondents in South Korea are prepared to put money in at the zero hour in the hopes that the economy may stabilize, which is the highest proportion of any country in the survey. This figure increases by an additional 37% when the Central Bank states that it aims for zero inflation. At MCS, balance is reached in both instances. 15.

Asian Tiger Countries' Entrepreneurial and Worker-Investing Populations
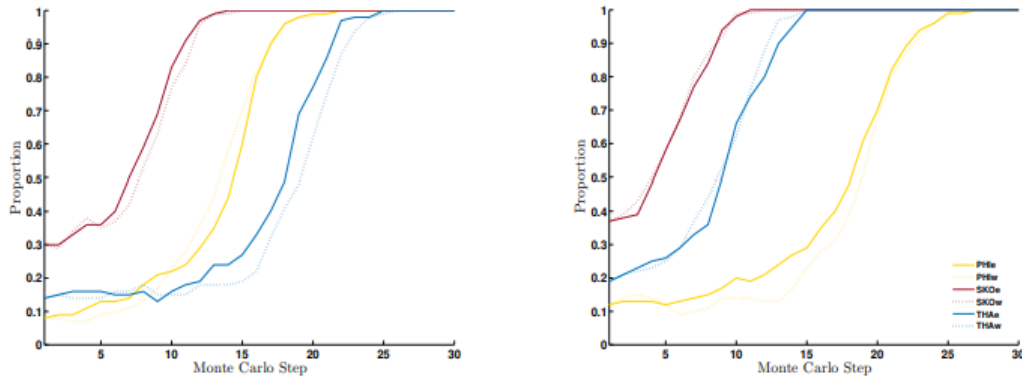
Figure 3: ACE. Left: The goal inflation rate is being pursued by the Central Bank. True: A zero-inflation rate is the goal of the Central Bank. The percentage of entrepreneurs (workers) in each of the Asian Tiger nations playing strategy I is shown by the solid (dashed) lines.

Our presentation makes it clear that in order to get the economy to a stable state with inflation matching the inflation objective, a lower proportion of participants ready to invest is required. Furthermore, it is evident that the ACE findings provide better stability to the replicator dynamics results. To back up the simulation findings, we'll provide some theoretical derivations in the following section.

CONCLUSION

In light of the central bank's stated inflation goal rate, this study proposes an ACE model to assess the possible equilibrium circumstances in which the economies of EMEs may experience high levels of investment. We use a stage game model in which entrepreneurs and workers play repeatedly, supposing that two equilibria occur when investment choices are complementary. One of the checks allows business owners and employees to put money in. To make sure the economy gets closer to the inflation goal, two things need to happen: (i) business owners need to show they're willing to put money into demand growth, and (ii) there has to be a big enough mix of workers and entrepreneurs investing right now. To steer the economy into such a favourable environment, measures must be put in place if these requirements are not met. However, the suggested model suggests that, in a balanced scenario, actors work together to prevent any economic investment.

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